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Research on the Innovative Model of Smart Teaching by Panoramic Data: Taking U Campus as an Example

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Abstract: With the development of smart teaching, the comparison between smart teaching and traditional teaching has become a hot topic. However, relatively few people have paid attention to the comparison of the learning effects of students at different learning stages in the smart classroom. Therefore, this study aims to, through data analysis and questionnaire surveys, further explore the relationship between students' engagement in the smart classroom and their final-term grades, as well as the relationship between the teaching effectiveness of the smart classroom and students' learning stages, among those students who all receive smart classroom education.

Keywords: Smart Teaching; College English Courses; U Campus

1. Introduction

Since the 18th National Congress of the Communist Party of China, the Central Committee with Comrade Xi Jinping as the core has placed education in a strategically prioritized position. The "Outline for Building an Education Power (2024-2035)" issued by the Central Committee of the Communist Party of China and the State Council clearly states that "empower education with digitalization and promote the transformation of teaching and learning" [1]. With the development of scientific and information technology and the continuous advancement of building an education power, smart learning environment have emerged as a result of the integration of traditional teaching model and information technology. They serve as the core front for promoting educational informatization and modernization [2-3]. In recent years, research on smart classrooms and smart education has become a hot topic. Peng discussed the definition of smart education in a broad sense [4]. The research teams led by Zhong and Wang studied and discussed the paradigm of smart education from different dimensions [5-6]. Moreover, there is an endless stream of research on the educational mode changes, curriculum design, and personalized education for students brought about by smart classrooms.

Tang, Qin and others pointed out that the hot research areas of smart education in China mainly revolve around four aspects: "what kind of concept to uphold", "how teachers teach", "how students learn", and "how to create an atmosphere" [7]. For example, Hu and Xu took the three dimensions of pre-class, in-class, and post-class as entry points to explore the smart teaching model, uncover the effective paths of data-driven teaching, and developed a teaching evaluation scale. The final results show that the classroom interactivity, enthusiasm, initiative, and students' academic performance in smart teaching are higher than those in traditional classrooms [8]. However, most of the previous research focused on comparing the differences between traditional teaching and smart teaching, lacking a comparison of the learning effects of students at different learning stages in smart education. Students at different learning stages vary greatly in terms of learning objectives, learning efficiency, learning ability, etc. Therefore, this study aims to further explore, under the panoramic data teaching scale, the relationship between students' participation in smart classrooms and their final-term grades, as well as the relationship between the teaching effectiveness of smart education and students' learning stages, for students who all receive smart education.

2. Design and Application of Smart Teaching Based on the U Campus Platform

2.1 Smart Teaching Driven by Panoramic Data

Panoramic data-driven teaching is a teaching model that utilizes data from the entire process and

multiple dimensions to optimize and enhance the teaching process. For example, by including pre-class and post-class periods in the consideration of students' learning, and using digital devices, we can monitor the number of times students complete their homework, their in-class speaking performance, and their inquiries about extended content. Smart teaching activities involve three parts: pre-class, in-class, and post-class.

(1) Pre-class

Online autonomous learning before class is an essential part of smart teaching. In this stage, students need to log in to U Campus in advance, watch relevant videos or preview knowledge, and conduct thinking and discussions as required to build a basic knowledge framework for the upcoming course. This process requires teachers to deeply study the teaching syllabus and teaching content, and design targeted pre-class learning activities based on students' learning situations. While guiding students to build a basic knowledge framework, teachers should stimulate students' curiosity and thirst for knowledge, so that they can enter the classroom with questions and thoughts.

(2) In-class

The in-class period is a crucial stage for knowledge interaction. In the face-to-face classroom, teachers are no longer restricted by the limitations of traditional teaching methods. Instead, by leveraging digital means, they can enable more efficient interaction among students. For instance, through U Campus, teachers can design in-class activities, pose questions, or receive problem feedback, etc., which helps them better grasp students' learning puzzles and knowledge absorption levels in real-time. Moreover, students can also engage in activities such as discussions, scoring, and peer evaluations on the software. Every student's speech and answer results can be presented in statistical form on the teacher's end. This smart classroom breaks through the limitations of time and space. While stimulating students' learning initiative, it also provides teachers with a basis for understanding students' learning situations, thus enabling continuous optimization of subsequent courses.

(3) Post-class

Homework and extended tasks after class are also completed online through U Campus. Teachers are not confined to the traditional homework model and can assign homework in diverse ways. Besides regular exercises, teachers can assign diversified homework by combining the teaching content with students' learning states before and during class, such as video analysis, group interviews, and paper expansion. After students submit their homework, the system automatically grades objective questions. Students can also view each other's group work and discuss it. Teachers can then understand students' mastery of knowledge points, analyze their weak areas, provide answers to questions, and obtain a basis for subsequent teaching.

2.2 Research Planning and Implementation Strategies

2.2.1 Research Questions

Based on various previous classroom practices and research findings, the smart teaching model can effectively enhance students' autonomous learning ability and classroom interactivity, and significantly improve students' academic performance. Building on these previous studies, the questions explored in this experiment are as follows:

(1) Under the smart teaching model, what is the relationship between students' participation in the smart teaching and their final-term grades?

(2) Is the teaching effect of the smart teaching related to students' learning stages?

2.2.2 Research Subjects

Fifty students (27 males and 23 females) from Class B of English major, Grade 2024, and forty - seven students (23 males and 24 females) from Class B of English major, Grade 2023, at Jilin University of Finance and Economics were selected as the research subjects. Their ages range from 18 to 20. The English test scores upon their enrollment in the first year of college were used as the class-division criteria, indicating that their English proficiency levels are comparable.

2.2.3 Research Methods

Students from both the 2024 (freshman) and 2023 (sophomore) classes received smart classroom teaching and used textbooks from the same series, namely New Horizon College English 1 and New Horizon College English 3. The freshmen in the 2024 class received smart classroom teaching for one semester in total, while the sophomores in the 2023 class received smart classroom teaching for three semesters in total.

2.2.4 Data Processing

The SPSS software was used to analyze the data. A Pearson correlation test was conducted on the

students' level of engagement in the smart classroom (U Campus) and their final-term grades. In addition, all extreme data that was lower or higher than 2.5 standard deviations was excluded. The students' grades conformed to a normal distribution, meeting the pre-requirements for the Pearson correlation test.

3. Analysis of the Effect of the Smart Teaching Model

3.1 Results and Discussion

The correlation analysis in the smart learning and final-term grades of freshmen and sophomores in table 1.

Table 1. Engagement in the Smart Teaching and Final-Term Grades of Freshmen and Sophomores

Grade	Parameters	Value
Freshmen	Pearson	0.253
	p	0.115
	N	40
Sophomores	Pearson	0.253
	p	0.115
	N	40

The average engagement of freshmen in the smart learning was 88.33, and the average final-term grade was 79.95. The Pearson correlation coefficient between them was 0.253, and the p value was 0.115. There was no significant difference, indicating that there was no obvious linear correlation between students' engagement in smart teaching and their grades. In other words, for students who had only received smart classroom teaching for one semester, it was not the case that the more they invested in U Campus, the higher their final-term grades would be. That is, it cannot be simply assumed that the higher the learning engagement, the higher the final-term grade.

The average engagement of sophomores in the smart classroom was 92.91, and the average final-term grade was 74.9. The Pearson correlation coefficient between them was 0.315*, and the p value was 0.048, which was less than 0.05, indicating a significant difference. This shows that for sophomores who had received smart classroom teaching for three semesters, there was an obvious linear correlation between their engagement in smart teaching and their grades. That is, the higher the students' engagement in smart teaching, the higher their final-term grades; while students with poor learning enthusiasm and low levels of engagement in the smart teaching lower final-term grades.

3.2 Analysis of the Reasons for the Difference in Pearson Correlation between Freshmen and Sophomores

Under the panoramic data-driven smart teaching of college English, the Pearson correlation between the learning engagement and final-term grades of freshmen and sophomores shows different results. The possible reasons for this phenomenon are as follows:

(1) Influence of the Learning Stage

Freshmen have just entered college from high school and are in an adaptation period. The teaching environment, atmosphere, and learning methods in college are different from what students have previously experienced. Therefore, freshmen may not have developed their stable learning patterns and attitudes yet, resulting in an unclear relationship between their engagement in the smart teaching and their final-exam grades. In contrast, sophomores have already received one-year of smart teaching. They are more accustomed to the learning style, mode, and atmosphere of the smart teaching, and they also have an understanding of the whole-process evaluation system. As a result, they can have clearer learning goals and internal driving forces. Thus, a higher level of engagement means more active participation in learning, leading to more satisfactory final-term grades. This can also be seen from the satisfaction questionnaires and interviews after the course.

College learning places higher demands on students' internal driving forces and self-learning abilities. This requires teachers to provide freshmen with more help and guidance regarding learning goals.

(2) Changes in Course Difficulty

Most of the freshman-year courses are general-knowledge-based, which connect well with high school English, and the course difficulty is relatively low. Some students can rely on their high-school English foundation and achieve good grades by cramming vocabulary before the exam. Therefore, there may be a ceiling effect where some students have a low level of participation but high final-term grades, resulting in a non-significant difference. In contrast, the learning difficulty and depth of sophomore-year courses have increased, with more open-ended questions that require students to discuss and consult materials. At this

time, students with a high level of participation in the smart classroom have more advantages, so they achieve higher final-term grades, showing a significant difference.

It can be seen that students' participation in the smart classroom is very important. This requires teachers to make full use of panoramic data-driven teaching, rationally design and plan teaching, and use digital technology to design intelligent learning arrangements for whole class. On the basis of improving students' knowledge and abilities, teachers should further stimulate students' learning interests, exploration, and critical thinking abilities.

(3) Development of Students' Self-management Ability

Freshmen have just transitioned from high school to college, and their time-management skills are relatively weak. Therefore, even if they have a high completion rate of online participation on U Campus, they may have difficulty converting knowledge, and there is a situation of "completing tasks just for the sake of completion". Even with a certain level of participation, due to the lack of internal learning goals and driving forces, they still struggle to master and convert knowledge. Compared with freshmen, sophomores have made certain progress in self-management ability. They have also thought about their learning paths and future to some extent. As a result, they are better at grasping efficiency and seizing in-class opportunities. Therefore, their learning participation can be more effectively reflected in learning outcomes, showing a significant correlation with final-term grades.

In conclusion, the result indicates that the implementation effect of the smart teaching is also affected by students' learning stages, that is, students' internal driving force is crucial. Therefore, the implementation of the digital smart teaching cannot be separated from teachers' guidance and shaping of students' internal learning goals.

3.3 Questionnaire Survey on Smart Teaching Satisfaction

After the course, in order to understand students' satisfaction with the smart teaching of college English courses driven by panoramic data, questionnaire survey and interview were adopted. Specifically, 71 questionnaires were randomly distributed among the experimental classes, and 71 valid questionnaires were collected, with a recovery rate of 100%. In the questionnaire, students were asked to rate their satisfaction (on a scale of 1-5) in 13 aspects, such as the rationality of teaching design and the integrity of teaching content. Students who chose 4 or 5 points were counted as highly satisfied. The survey results show that, 93% of the students believe that it can meet the individualized learning needs of students. 95.8% of the students think that the teaching content is complete. It received the highest-score evaluation among the thirteen satisfaction surveys, with 95.7% of the students believing that the teaching evaluation is diverse and can provide scientific evaluation results through multiple dimensions and methods.

Whether freshmen or sophomores, in the self-assessment of whether smart teaching was helpful to their final exams, they showed a high level of satisfaction. 85.9% of the students thought that U Campus was very helpful to their final exams. In the interviews, they also said that "it can consolidate and review knowledge points well, effectively avoiding last-minute cramming before the final exams." Interestingly, their self-assessment scores on stimulating autonomous learning initiative were slightly conservative. 18.3% of the students thought that their learning initiative was low. In the interviews, they also mentioned "completing tasks just for the sake of completion." This indicates that teachers need to pay attention to integrating teaching resources and tools in smart teaching, give students space for autonomous learning, so as to further stimulate students' internal learning motivation. In addition, compared with the satisfaction of other measurement indicators, the satisfaction with learning initiative is relatively low, which may further explain the phenomenon that there is no significant correlation between freshmen's participation in the smart learning and their final-term grades. That is, some students participate in online and offline activities with a task-completing mentality. Although they complete the tasks, due to their low learning initiative and perfunctory attitude, their participation is high, but their final - exam scores are not satisfactory.

In the interviews, students generally indicated that compared with the traditional teaching mode, the smart teaching has obvious advantages. While enriching classroom activities and resources, it enables more convenient "fingertip learning", and frequently receives feedback such as "more

interactive" and "more interesting". Some students also said, "When I encounter knowledge points that I don't understand, U Campus can provide more examples, videos, and other explanations, offering more learning channels, which better meets my learning needs".

4. Conclusion

In summary, as a carrier of "digitally empowering education and promoting the transformation of teaching and learning", smart teaching creates a coherent and efficient learning path for students through pre-class autonomous learning, in-class interactive learning, and post-class consolidation and expansion. However, teachers should also note that the results of smart teaching do not come overnight. Students' academic performance is also affected by their learning stages, internal learning drive, and self-discipline. This requires teachers to adjust their teaching strategies more specifically according to different learning stages. Only in this way can the teaching mode of the smart classroom be continuously improved, promoting the all-round development of students and achieving the in - depth integration of digital technology and education.

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