The Impact of Smart Classrooms to Improving Teaching Quality in Guizhou Vocational College of Industry and Commerce

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Abstract

This study examines teaching quality in regular classrooms and evaluates the impact of smart classrooms at Guizhou Vocational College of Industry and Commerce. Guided by Educational Quality Theory, Educational Management Theory, and Teaching Assessment Theory, the research focuses on three objectives: 1) assessing the current teaching quality in regular classrooms, 2) identifying key factors influencing teaching quality, and 3) evaluating the effect of smart classrooms. A quantitative approach was used, with data collected from 315 full-time teachers via a questionnaire employing a five-point Likert scale. SPSS software was used for analysis, including descriptive statistics, reliability testing (Cronbach's alpha), and factor analysis (KMO test).

Findings indicate that while 60% of respondents rate regular classroom teaching quality as good, areas such as professional experience, self-study skills, and student interaction need improvement. Smart classrooms significantly enhance teacher satisfaction, student engagement, and classroom interaction. Key factors affecting teaching quality include technology integration, teacher training, and administrative support. The study recommends improving smart classroom infrastructure, enhancing personalized learning support, and integrating technology more effectively into teaching practices. These insights can help educational institutions enhance teaching quality through technological advancements.

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Introduction

In the rapidly evolving era of technology, education is undergoing a transformation through the integration of innovative tools and methods. One significant development is the introduction of smart classrooms, which utilize digital technology to provide a personalized and intelligent interactive space for teaching activities. By combining physical and digital spaces, as well as local and remote elements, smart classrooms enhance the relationship between individuals and the learning environment. This enables natural interaction between people and their surroundings within the learning space, fostering personalized, open, and ubiquitous learning (Hongyun, 2021). The emergence of smart classrooms signifies a paradigm shift in educational practices, offering unprecedented opportunities to enhance teaching quality and engagement within academic institutions.

With the application of new information technologies such as the internet of things, artificial intelligence, cloud computing, and big data in teaching, various classroom solutions tailored for interactive teaching between teachers and students have emerged. Numerous educational institutions have established their own versions of smart classrooms, each contributing to the adjustment and transformation towards an intelligent teaching structure (Xuanling Lv, 2019).

Like many institutions worldwide, Guizhou Vocational College of Industry and Commerce faces the challenge of adapting its teaching methods to meet the evolving needs and expectations of students raised in the digital age. Traditional lecture-based pedagogies often struggle to fully engage these tech-savvy learners, potentially affecting the overall effectiveness of education. In response to this challenge, exploring the impact of smart classrooms on teaching quality is not only timely but essential. This study focuses on Guizhou Vocational College of Industry and Commerce, where a total of 315 full-time teachers participated in the survey. Through the analysis of questionnaire responses, the study examines the current state of teaching quality in regular classrooms, the key factors influencing it, and the impact of smart classrooms on improving teaching quality.

Research Objectives

1. To understand the teaching quality situation in regular classrooms in Guizhou Vocational College of Industry and Commerce.

2. To analyze the factors affect the teaching quality in regular classrooms in Guizhou Vocational College of Industry and Commerce.

3. To find the impact of smart classroom on teaching quality in Guizhou Vocational College of Industry and Commerce.

Research Methodology

This study used quantitative research methods, selecting representative samples of teachers and students from Guizhou Vocational College of Industry and Commerce to assess the factors influencing smart classroom teaching quality. By examining regular classrooms, key factors affecting teaching quality were analyzed, and differences between smart and regular classrooms were identified for optimization. The sample size was set at 315 using the Taro Yamane formula, through random sampling of full-time teachers, questionnaires was written on the Wenjuanxing platform and distributed through online communication tools such as E-mail, WeChat, and QQ. A five-point Likert scale was used, with response levels: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1).

The collected data was analyzed using SPSS software and processed on a computer. To assess the reliability of the data, Cronbach's alpha coefficient was applied, while the KMO value was used for factor analysis. Finally, the relationships between variables were examined to ensure the validity of the survey results.

In order to answer research questions, the research inputs survey data into a computer and use SPSS software for statistical analysis, including median, mode, mean and standard deviation.

Mean: A quantity that indicates the trend of a set of data. It is the sum of all observations divided by the number of observations. It is used to indicate the approximate average level of the data.

Median: It is the number in the middle of a set of data arranged in order. It represents a value in a sample, population or probability distribution. It is the observation in the middle after the data is sorted by size.

Mode: The observation with the highest frequency in the data.

Standard Deviation: The degree of dispersion of the mean of a set of data. The larger the standard deviation, the farther most values are from the mean; the smaller the standard deviation, the closer the values are to the mean.

Results

The researcher first validated the reliability of data collection and the results are shown in Table 1

Cronbach's Alpha	N of Items
.985	83

Table 1 Reliability Statistics

According to Table 1, a total of 83 questions in the scale were tested for reliability using the Cronbach model. The results showed that the Cronbach's alpha coefficient of the questionnaire was 0.985, indicating an extremely high internal consistency.

To assess the validity of the questionnaire, the KMO and Bartlett sphericity tests are performed in Table 2

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.857
Bartletts Test of Sphericity	Approx. Chi-Square	4160.188
	df	1128
	Sig.	.000

Table 2 KMO and Bartletts Test

According to Table 2, the Kaiser-Meyer-Olkin (KMO) value of 0.857 indicates that the data are suitable for factor analysis. KMO values greater than 0.7 are generally considered a better indicator for factor analysis. In addition, the Bartlett spherical degree test showed that the approximate chi-square value is 4160.188, the degree of freedom is 1128, and the significance level (Sig.) is 0.000. This indicated a significant correlation between the variables and the data structure was suitable for factor analysis, thus further validating the construct validity of the questionnaire.

Through the analysis of research data, the following conclusions were drawn:

1. According to Taro Yamane's sample size calculation formula, a total of 315 full-time teachers from Guizhou Vocational College of Industry and Commerce were selected for the survey. Through the analysis of survey data, it was found that the teaching quality in regular classrooms of Guizhou Vocational College of Industry

and Commerce in good condition but still has considerable room for improvement. While 60% of respondents are mostly satisfied with the teaching quality, negative feedback mainly focuses on the positive impact of professional experience, self-study skills outside the classroom and students' classroom interaction. The introduction of smart classrooms provides an effective way to solve these problems.

2. The questionnaire contained 91 questions in total. The survey data were entered into a computer and statistical analysis including median, mode, mean and standard deviation was performed using SPSS software.

Current Teaching Quality Situation in Regular Classrooms	Mean	Median	Mode	S.D.
1. Are you satisfied with the current teaching methods in regular classrooms?	3.413	4	5	1.371
2. Are students actively engaged during lessons in regular classrooms?	3.149	3	4	1.109
3. Does your professional experience positively influence the teaching quality in regular classrooms?	3.076	3	4	1.112
4. Is it convenient for students to actively participate, think, and discuss in regular classrooms.	3.124	3	4	1.146
5. Is the support given to students in regular classrooms in self-study situations outside the classroom sufficient?	3.105	3	4	1.153
6. Can regular classrooms effectively measure students' learning outcomes through summative assessments (such as final exams)?	3.159	3	4	1.134
Factors Affect the Teaching Quality in Regular Classrooms	Mean	Median	Mode	S.D.
7. Do you think teacher satisfaction is the main factor affecting teaching quality?	3.384	4	5	1.399
8. Do you think teaching design is the main factor affecting teaching quality?	3.165	3	4	1.142

Factors Affect the Teaching Quality in Regular Classrooms	Mean	Median	Mode	S.D.
9. Do you think the adequacy of teacher training and skill enhancement opportunities is the main factor affecting teaching quality?	3.203	3	4	1.152
10. Do you think the supportive learning environment is the main factor affecting teaching quality?	3.190	3	4	1.146
11. Do you think the adequacy of teacher training programs provided by schools is the main factor affecting teaching quality?	3.114	3	4	1.159
12. Do you think have sufficient administrative support is the main factor affecting teaching quality?	3.130	3	4	1.175
13. Do you think the integration effect of technology in regular classroom teaching practice is the main factor affecting teaching quality?	3.203	3	4	1.144
14. Do you think the assessment criteria is the main factor affecting teaching quality?	3.194	3	4	1.078
Smart Classrooms Impact of Teaching Quality	Mean	Median	Mode	S.D.
15. Do you think smart classrooms (for example, classrooms equipped with multimedia tools, digital technology, interactive software, and audio equipment) can improve teacher satisfaction?	3.498	4	4	1.343
16. Do you think smart classrooms can increase students' participation in the classroom?	3.219	3	4	1.131
17. Do you think the teacher-student relationship and classroom interaction are effective in a smart classroom environment?	3.257	3	4	1.095

Smart Classrooms Impact of Teaching Quality	Mean	Median	Mode	S.D.
18. Do you think smart classrooms can support students' self-learning?	3.222	3	4	1.176
19. Do you think smart classrooms can improve the effectiveness of teaching process management?	3.270	3	4	1.047
20. Do you think smart classrooms can improve the effectiveness of solving classroom problems between teachers and students?	3.244	3	4	1.086
21. Do you think smart classrooms can improve the integration effect in teaching practice?	3.273	3	4	1.092
22. Do you think smart classrooms can effectively complete teacher self-assessment?	3.210	3	4	1.132

Table 3 Descriptive statistics

According to Table 3, Therefore, the impact of smart classrooms to improving teaching quality in Guizhou Vocational College of Industry and Commerce is summarized as follows:

Firstly, for the first question, the teaching quality in regular classrooms in good condition but still has considerable room for improvement. While respondents are mostly satisfied with the teaching quality, negative feedback highlights areas such as the positive impact of professional experience, self-study skills outside the classroom and students' classroom interactions.

Secondly, for the second question, the most important factor influencing teaching quality is teacher satisfaction, the second most important factors are learning environment, technology integration practices, teachers training and administrative support in improving teaching quality, teaching design, effectiveness of peer assessment. Additionally, aspects such as teachers training, and assessment criteria is also important to improve the teaching quality.

Finally, for the third question, teacher satisfaction improved by smart classrooms (for example, classrooms equipped with multimedia tools, digital technology, interactive software and audio equipment) is the most important factor

affecting teaching quality. In addition, the proportion of respondents who hold a positive attitude towards factors such as smart classrooms in improving technology integration practices, teacher self-assessment, classroom interaction, students self-learning, students' participation are also relatively high.

Discussions

This research aimed to investigate the current teaching quality in regular classrooms and analyze the impact of smart classrooms on teaching quality at Guizhou Vocational College of Industry and Commerce. Negative feedback in regular classrooms largely focused on areas such as classroom interaction, self-study support outside the classroom, and the integration of professional experience into the curriculum. In terms of smart classrooms, the study found significant positive impacts on teaching quality, particularly in improving teacher satisfaction, increasing student participation, enhancing classroom interaction, and fostering self-learning. Smart classrooms, with their use of multimedia tools and digital technologies, were found to be an effective solution for addressing many of the challenges identified in traditional classroom settings.

The findings can be attributed to several factors. The limited interaction and lack of integration of digital tools in traditional classrooms hinder the full engagement of both teachers and students, as noted by previous studies on teaching quality (Yan Liu, 2012). Smart classrooms, by contrast, promote more dynamic and flexible teaching environments, offering teachers the tools to engage students actively and provide personalized learning experiences. This aligns with educational theories that emphasize the importance of student-centered learning and interactive teaching methods (Zengjun Feng, 2004). Additionally, the positive feedback on teacher satisfaction and student participation can be explained by the enhanced technological capabilities in smart classrooms, which allow for real-time feedback, better classroom management, and increased student engagement.

The findings of this study are consistent with previous research on the integration of technology in education. For instance, Xuanling Lv (2019) highlighted that smart classrooms have a significant positive impact on teaching effectiveness by improving communication and interaction between students and teachers. Liu Zhentian (2018) also emphasized the importance of technology in fostering a more

flexible and engaging learning environment. In this study, the findings align with these views, showing that smart classrooms not only improve the teaching experience but also support the overall quality of education by enhancing teacher-student interactions, engagement, and personalized learning.

Thus, this study's findings are validated by existing literature, reinforcing the notion that the adoption of smart classrooms can significantly enhance teaching quality by addressing key limitations of traditional classroom settings. Future studies could expand on these results by exploring the effectiveness of specific technologies used in smart classrooms and their long-term impact on student learning outcomes.

New Knowledge

The implementation of smart classrooms at Guizhou Vocational College of Industry and Commerce illustrates the broader implications of technological integration in vocational education. This study serves as a reference for other institutions considering similar transformations, offering insights into the benefits and challenges of integrating smart technologies in higher education. The research underscores the sustainability of smart classroom models by promoting rational resource allocation and long-term educational improvements. The ability of smart classrooms to streamline administrative processes, facilitate teacher self-assessment, and support continuous professional development aligns with the evolving trends in educational ecology and management.
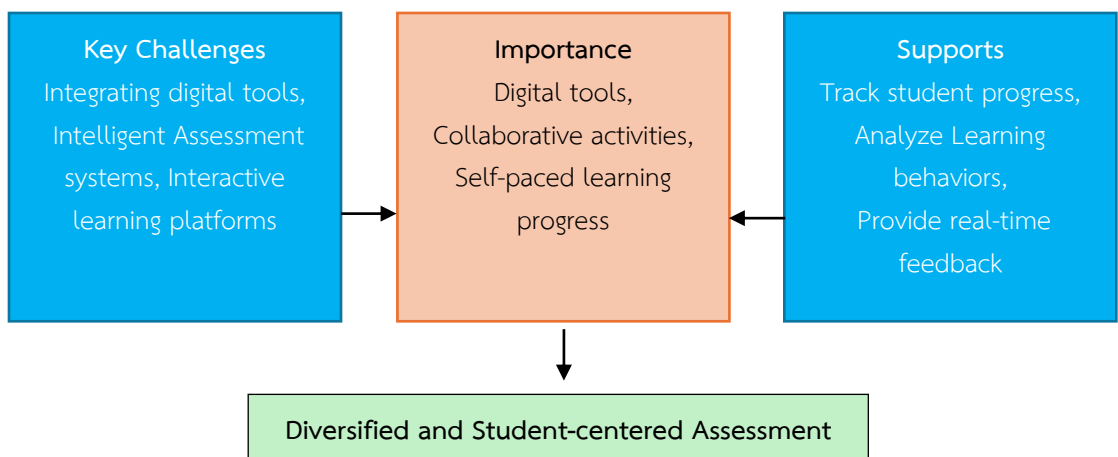

Figure 1 New knowledge

In conclusion, this study contributes to the growing body of knowledge on smart classroom implementation, providing empirical evidence on their impact on teaching quality, student engagement, and educational management. Future research could explore further technological innovations and their applications in different educational contexts to expand the understanding of smart learning environments.

Conclusions and Suggestions

The conclusions of this study are mainly based on the existing fixed scenarios and disciplines in Guizhou Vocational College of Business and Industry, but we can draw some important findings that the introduction of smart classrooms can effectively solve the problems in terms of improving the quality of teaching and learning. Therefore, the following recommendations for research and practice are made in response to these findings:

1. Suggestions for future research

Expanding the scope of the study: the follow-up study can be promoted in different subject areas to explore the differences between different majors in the application of the smart classroom, and then to explore its impact on the quality of teaching. Strengthening empirical research on the integration of technology and teaching: the follow-up study can explore in depth the application effects of different smart devices and teaching software in the actual classroom in order to provide more empirically valuable data support for the selection of smart teaching tools and the adjustment of teaching methods.

Further research on students' subjective experience: the follow-up study is suggested can focus more on students' subjective experience, including their acceptance of smart classrooms, changes in learning attitudes, and satisfaction with the teaching methods, in order to further deepen the understanding of the students' learning behaviors and psychological changes in smart classroom environments.

2.Recommendations for college organizations

Strengthen smart classroom facilities and management: The school should invest more in smart classroom facilities, enhance the functionality and usability of teaching equipment, and ensure stable and efficient hardware to support smart

teaching. Regular maintenance and updates are necessary to prevent equipment failures from affecting teacher satisfaction and teaching quality.

Improve personalized learning support and feedback: Schools should establish a comprehensive personalized learning system in smart classrooms to offer students more independent learning opportunities. Through data analysis, teachers should provide timely feedback on students' progress and challenges, adjusting content and methods to meet individual needs for tailored teaching.

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