The Application of Smart Classroom Management System to Cultivate College Students' Independent Learning Ability in Higher Education Institutions

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Abstract: The deep integration of network technology and education has resulted in a variety of developments in the field of education, and the digital education model has steadily evolved towards a higher educational growth path such as "intelligent education" or "future education". As the primary means of teaching and educating people in the age of intelligent education, the smart classroom is critical to realizing the change of education from knowledge talents to intelligent talents. This research discovers that wisdom classroom practices the concept of "student-centered" and is changing to the construction concept of "enabling students' intelligent development" from the standpoint of nurturing college students' autonomous learning ability. At the same time, this paper discusses the importance and value of smart classrooms through a systematic analysis of higher vocational teaching activities in a smart classroom environment, and proposes how to establish a smart classroom management system to cultivate the independent learning ability of college students in higher vocational colleges, in order to enrich and improve the smart classroom education system and teaching mechanism in higher vocational colleges.

Keywords: Wisdom Classroom, Higher Vocational Colleges, Independent Learning, College Student Ability Development

1. Introduction

Under the combined backdrop of typed development of vocational education and slowing economic growth, influenced by new generation of technology factors such as big data, cloud computing, and smart campus, vocational college students differ in independent learning, self-management, and independent learning, resulting in more and more learning gaps in learning plans, learning objectives, learning abilities, and self-summary. As a result, pupils' autonomy, holistic development, and other educational issues are incomplete [1]. When compared to undergraduate colleges, vocational colleges have major distinctions in student characteristics and talent training orientation, thus demands fluctuate with time and with new. As a result, higher vocational colleges must consider the application research and analysis of the smart classroom management system to the cultivation of college students' autonomous learning ability and actively reconstruct the smart classroom model system. Using theories such as pedagogy and psychology, this paper attempts to systematically construct and optimize the intelligent classroom management system model of higher vocational students in order to provide a foundation for the cultivation and application of students' autonomous learning ability in higher vocational colleges.

2. Concept and Characteristics of Wisdom Classroom

2.1. Concept of Smart Classroom

Cloud computing, big data, blockchain, and other new technologies are widely employed in many aspects of life in China, thanks to the rapid development of Internet technology, and the field of education is also actively applying new technologies to classroom teaching. The most natural example

of the profound integration of information technology and education is the smart classroom [2]. At the moment, there is no agreement on what constitutes a smart classroom. For example, Zhu (2019) believes that smart education is to create a spatial-temporal environment of smart learning with perception, reasoning, and auxiliary abilities by fully utilizing the benefits of information technology, in order to achieve learners' stable, coordinated, comprehensive, and long-term development [3]. As a result, according to this paper, a smart classroom is a teaching activity that is based on digital, intelligent, and personalized classroom teaching environment, and uses smart teaching mode to improve students' ability, promote students' growth, cultivate creativity, and highly skilled talents, in order to achieve a high degree of integration of information technology and classroom teaching. Smart classrooms may help teachers implement learning situation diagnosis and analysis, as well as resource intelligent push, as well as carry out "cloud + terminal" learning services and evaluate and record students' learning processes using numerous intelligences [4]. At the same time, wisdom classroom can improve students' study habits, promote students' grasp of knowledge, develop students' practical abilities, and cultivate students' divergent and creative thinking.

2.2. Characteristics of the Smart Classroom

The traditional classroom has undergone fundamental changes from the interior to the outside and from the surface to the inside thanks to the deep integration of modern information technology, creating a new teaching paradigm. The information interaction, classroom form, learning environment, teaching mode, classroom management, and teaching carriers are all becoming increasingly intelligent in the modern classroom, which blends artificial intelligence, big data, and the Internet of things [5]. The following characteristics mostly illustrate the smart classroom.

2.2.1. Stereoscopic Teacher-Student Interaction

The smart classroom eliminates the time and space constraints of traditional teaching, making interaction and communication between professors and students more flexible and three-dimensional [6]. It has evolved from the classic linear model of "one-way" interaction between professors and students to a multilateral, open, three-dimensional, and diversified model, which enables communication and interaction between teachers and students more efficient and rapid [7].

2.2.2. Intelligent Teaching Carrier

The traditional "one-way" teaching method can no longer meet the teaching requirements of the new era, and the teaching carriers of the new era can meet the various teaching needs of an increasing number of learners with the assistance of technologies such as Internet+, artificial intelligence, the Internet of things, and big data [8]. The effective integration of classroom carriers, curriculum carriers, material carriers, and cultural carriers emphasizes the features of wisdom and encourages the creation of online learning spaces to stimulate students' learning interests and improve learning effects [9].

2.2.3. Evaluation Process Data

Intelligent classroom construction may dynamically distribute teaching data throughout the classroom, making the data base of teaching evaluation in higher education institutions more real and effective [10]. Teachers use big data fed by various intelligent platforms to collect, mine, and analyze information to grasp the current student learning situation more quickly, clearly, and comprehensively scientifically, make scientific teaching decisions quickly, and optimize and improve teaching in real time [11].

2.2.4. Systematization of Management Process

The classroom system, instructor system, and student system are the three components of the smart classroom system [12]. The teacher system includes question systems, homework systems, explanation systems, training systems, question-answer systems, etc. The student system includes reminder systems, feedback systems, practice systems, communication systems, voice systems, and the classroom system includes practice systems, activity systems, cooperation systems, examination systems, sports systems, professor systems, etc. Each part also establishes corresponding subsystems in combination with common functions. These systems effectively support student-centered learning, move away from one-way knowledge distribution to intelligent education, apply dynamic network control, cross-fuse information from students and teachers, and fully foster students' capacity for autonomous learning.

3. Construction and Analysis of Evaluation Indexes of Smart Classroom Management System

3.1. Evaluation Index Construction of Smart Classroom Management System

Based on the preceding explanation, this study used the Delphi approach to alter and improve the initial generation-oriented smart classroom evaluation index system. An expert advisory group of 15 specialists from relevant research domains and subject teachers was formed for this evaluation index system. The constructive and critical opinions of the expert advisory group were incorporated into the establishment of the indicators of the generation-oriented smart classroom evaluation index system and the description of the index expectations throughout the entire evaluation index system construction process, as shown in Figure 1.
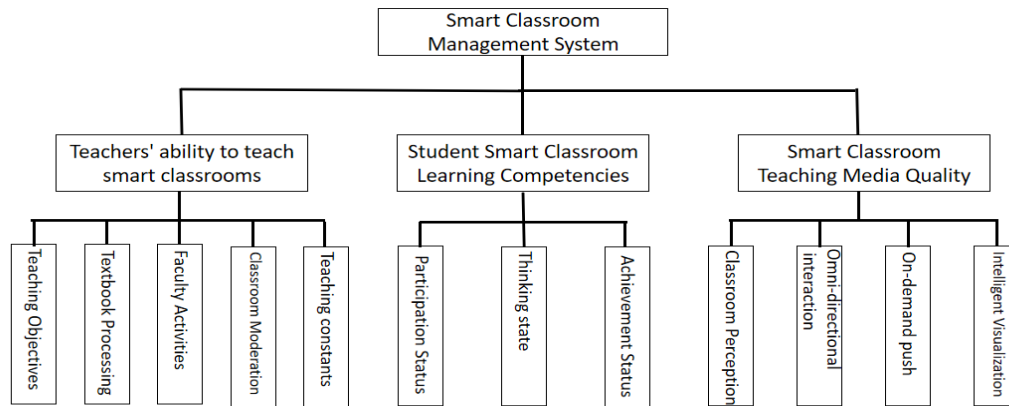

Figure 1: Assessment elements of smart classroom management system for college students.

3.2. Questionnaire Survey and Data Analysis

This survey's main target is students of vocational colleges who have received smart classroom management, and 288 questionnaires were sent to students of vocational colleges via the credamo platform, with the basic information of this group being gender, grade, household registration, per capita monthly household income, and monthly personal consumption expenditure, and invalid questionnaires and repeatedly filled questionnaires were deleted. In this survey, 265 valid questionnaires were finally screened out, and the questionnaire efficiency rate was 92.01%; specific demographic information is presented below is shown in Table 1.

Table 1: Descriptive statistics of the sample (N=265).

Variables	Category	Number of people	Specific Gravity	Variables	Category	Number of people	Specific Gravity
SEX	Male	115	43.4%	Monthly per capita household income	Less than 1000 RMB	140	52.8%
	Female	150	56.6%		1000-2000 RMB	73	27.5%
GRADE	Freshman	94	35.5%		2000-3000RMB	39	14.7%
	Sophomore	123	46.4%		More than 3000 RMB	13	4.9%
	Junior	48	18.1%	Monthly personal consumption expenditure	Less than 1000 RMB	99	37.4%
Household Registration	Rural	87	32.8%		1000-1500RMB	144	54.3%
	Urban	178	67.2%		1500-2000RMB	19	7.2%
					More than 2000 RMB	3	1.1%

3.2.1. Reliability Test

The accuracy, consistency, and stability of the answers to all questions of the same variable in the survey questionnaire are tested using the reliability test. The reliability analysis process of SPSS27.0 was used to calculate the internal consistency coefficient of the complete sample data of the formal

survey in this paper. According to previous researchers' measuring criteria, a Cronbach's a coefficient between 0.7 and 0.9 indicates that the scale is stable. If the Cronbach's a coefficient is less than 0.5, the scale is seen more problematic [13]. The Cronbach's values of the important variables in this paper are all greater than 0.7, suggesting that the scale utilized is reliable, and the findings of the specific reliability analysis are provided in Table 2.

Table 2: Results of reliability analysis of the survey.

Variables	Cronbach's α	Number of questions
Teachers' ability to teach smart classrooms	0.717	5
Student Smart Classroom Learning Competencies	0.859	3
Smart Classroom Teaching Media Quality	0.851	4
Smart Classroom Management System Score	0.852	4

3.2.2. Validity Test

A questionnaire's validity is evaluated to see if it captures the requested data. The scales employed in this study exhibited good validity, as evidenced by the KMO values for each variable being higher than the threshold of 0.7, the Bartlett's sphericity test values passing the significance level of 0.05, and the p-values being less than 0.001 is shown in Table 3.

Table 3: KMO and Bartltt's sphericity test for each variable.

Variables	KMO Test	Bartlett's Sphericity test	Cumulative Variance Contribution %
Teachers' ability to teach smart classrooms	0.768	407.983	52.547%
Student Smart Classroom Learning Competencies	0.706	390.091	78.088%
Smart Classroom Teaching Media Quality	0.798	476.605	69.391%
Smart Classroom Management System Score	0.788	464.436	69.252%

3.2.3. Data Analysis

Drawing on relevant research findings from scholars at home and abroad [14-15], this paper uses smart classroom management system scores as explanatory variables of the model, teachers' smart classroom teaching ability, students' smart classroom learning ability, and smart classroom teaching media quality as explanatory variables, and controls for demographic variables (such as age).

$$SCMSC = \alpha_1 TAOICT + \alpha_2 SLAUSC + \alpha_3 ICTMQ + \beta + \varepsilon \tag{1}$$

Note: In the linear regression model, α represents the regression coefficient of each influencing variable, SCMSC represents Smart Classroom Management System score, TAOICT represents Teacher Smart Classroom Teaching Competence, SLAUSC represents Student Smart Classroom Learning, ICTMQ represents Competence Smart Classroom Teaching Medium Quality, β is the intercept term, and ε is the error term is shown in Table 4.

According to the data presented in this paper, the demographic variables did not differ significantly from the model presented in this paper ($p > 0.1$), and the regression coefficient of teachers' wisdom classroom teaching ability was 0.275, which significantly and positively influenced the wisdom classroom management system scores ($p = 0.0000.01$), indicating that improving teachers' teaching ability can promote the development of the wisdom classroom management system and, ultimately, achieve t Simultaneously, students' learning ability in the smart classroom is strongly positively connected with the smart classroom management system ($p = 0.0000.01$), with the strongest regression coefficient of the three (0.471). As a result, in the smart classroom, kids should be encouraged to actively learn, focus on the classroom, actively think about problems, think independently and ask questions, and proudly present individual viewpoints. Finally, the quality of educational media in smart classrooms can positively affect the smart classroom management system ($p = 0.019 < 0.05$, and the regression coefficient is 0.172). To better serve educational activities in the future, we will also need to continuously develop the hardware and software equipment of smart classrooms.

Table 4: Results of multiple regression analysis.

Variables	Coefficient	SE	T	P
C	0.083	0.285	.290	.772
Teachers' Ability To Teach Smart Classrooms	.275	.059	4.688	.000
Student Smart Classroom Learning Competencies	.471	.065	7.201	.000
Smart Classroom Teaching Media Quality	.172	.073	2.360	.019
Sex	-.017	.074	.141	.888
Grade	.060	.051	-.322	.747
Household Registration	.068	.079	.764	.446
Monthly Per Capita Household Income	.031	.044	1.530	.127
Sex	-.017	.061	.512	.609

4. A Long-Term Mechanism of Intelligent Classroom Management System to Cultivate College Students' Independent Learning Ability in Higher Education Institutions

First, we improve the role of the major school education forum in leading the growth of college students' autonomous learning ability. For schools, implementing collaborative teaching in the smart classroom system improves students' academic performance, increases students' self-efficacy, mobilizes students' learning excitement, and promotes students' academic achievement.

Second, the important mission of developing moral education and encouraging the general development and healthy growth of college students is being carried out. Using teaching reform practice to fully implement the fundamental task of establishing moral education, promote students' overall development through the intelligent classroom system, scientifically grasp the direction of school operation, and systematically lay out school operation behavior.

Third, constantly adhere to educational and teaching law, with an emphasis on developing a high-quality education system in higher vocational institutions. The creation of a smart classroom management system must rely on a high-quality school education system, so that the school education system has greater educational leadership, with the purpose of moving toward the goal of constructing a high-quality education development system.

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