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Research on Classroom Satisfaction and Influencing Factors in Smart Classrooms Among College Students in S City of Hubei Province

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Abstract: This article aims to analyze the satisfaction and influencing factors of university students with smart classroom teaching in S city of Hubei province. By randomly sampling 742 college students from four universities in S city of Hubei province, individual characteristics, teacher factors, teaching quality, Student-related factors teaching environment and classroom satisfaction were investigated. The data were analyzed using Multiple Regression Analysis. The results show that curriculum structure, assessment mechanism, student learning motivation, physical environment, resource accessibility and so on are the most important factors affecting the satisfaction of university students with smart classroom teaching. Therefore, this article believes that improving teachers' teaching and students' learning, optimizing teaching environment and improving teaching quality are effective strategies to improve the classroom satisfaction of university students with smart classroom teaching.

Keywords: Smart Classroom; Classroom Satisfaction; Influencing Factors

1. Introduction

The smart classroom, as a new type of intelligent learning environment, has been widely used in higher education in recent years. It provides university students with a more efficient and interactive learning experience by optimizing the presentation of learning content, facilitating access to learning resources, providing a variety of cognitive tools, promoting in-depth interaction in the classroom, and supporting immediate teaching evaluation [1]. Against the background of educational Information Technology 2.0, the smart classroom is considered an important place for implementing smart education. Its application can not only support a variety of teaching designs but also help integrate information technology with classroom teaching [2].

However, although smart classrooms have a significant potential to enhance the quality of teaching, their actual application effect is affected by many factors. For example, the degree of mastery of teachers, the perfection of technical support and the acceptance of students will directly affect the satisfaction of classroom teaching [3,4]. Research shows that the acceptance and satisfaction of college students as the main body of smart classroom users directly affect the use effect, promotion and development of smart classrooms [5]. Therefore, it is necessary to explore the satisfaction of college students with smart classroom teaching and its influencing factors.

In real application, the satisfaction evaluation of smart classrooms can be analyzed from multiple dimensions. For example, pedagogy, space, and technology are important factors affecting student satisfaction, among which the influence of pedagogy is the greatest [5]. In addition, student satisfaction with smart classrooms is also affected by learning expectations, perceived experience, and perceived value, which affect the overall classroom teaching effect by affecting learner satisfaction [5]. Therefore, constructing a scientific and reasonable smart classroom satisfaction evaluation system is not only helpful to improve the classroom experience of students but also provide a theoretical basis for the construction and optimization of smart classrooms in colleges and universities [6].

In summary, smart classrooms have significant potential to enhance college students' engagement and satisfaction in the classroom learning process, but their actual application effects still need further research and

optimization. By analyzing college students' satisfaction with smart classroom teaching and its influencing factors, it is possible to provide a scientific basis for the promotion and application of smart classrooms, thus better meeting the learning needs of college students and improving teaching quality and learning outcomes.

2. Data and Methods

2.1 Source of Data

The current research takes the college students who have been studying in the smart classrooms of four universities in S city of Hubei province for a long time (no less than half a year) as the research sample. The survey adopts online and offline dual-channel data collection methods, and the participants are required to complete the questionnaire independently based on their personal reality to ensure that the answers are not affected by subjective factors. A total of 800 questionnaires were issued in this survey, and 742 valid questionnaires were finally collected, with an effective recovery rate of 92.75%.

2.2 Methodology

2.2.1 Research instrument

The research referred to the questionnaire of "Investigation of Students Satisfaction in Ordinary College Classroom Teaching" by Wang Xinxin, et al. [7]. The questionnaire consists of two parts, i.e. Basic information of college students and the Satisfaction Scale of Smart Classroom for College Students. The survey includes:(1) Personal characteristics: gender, age, major, etc; (2)Teacher factors: teaching ability, interaction feedback, teaching enthusiasm, fairness and justice, etc; (3)Teaching quality: curriculum structure, resource quality, assessment mechanism, cutting- edge of knowledge, etc.; (4)Student-related factors: learning motivation, class participation, ability matching, peer influence, etc;(5)Teaching environment: physical environment, technical support, resource accessibility, etc. Considering that this scale could not cover every aspect of smart classroom teaching, the "overall satisfaction degree of smart classroom teaching" and subjective question "Other factors affecting the satisfaction of college students in smart classrooms" were designed, and Lickert 5-level positive measurement method was used for statistics [8].

2.2.2 Research methodology

The current research takes the classroom satisfaction of smart classrooms among college students in S city of Hubei province as the dependent variable. The dependent variable is the overall in-class satisfaction with the smart classroom, which is an ordinal Multi-category variable specifically divided into five levels: 1 = very dissatisfied, 2 = relatively dissatisfied, 3 = general, 4 = relatively satisfied, and 5 = very satisfied [9]. Based on the ordinal classification characteristic of this variable, this study uses an ordinal logistic regression model for analysis, aiming to explore the influencing factors of college students' in-class satisfaction with smart classrooms.

The research model is constructed as follows: the dependent variable is classroom satisfaction (y), and the independent variable (regression factor) includes four dimensions of evaluation indicators: (1) Teacher Factors (X_1), (2) Teaching Quality (X_2), (3) Student Self-factors (X_3), (4) Teaching Environment (X_4), and the model expression is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots \beta_k X_k + \varepsilon$$

where: β_0 is the intercept term, and $\beta_1,\beta_2,\ldots,\beta_k$ are the regression coefficients, indicating the effect of each regression factor on the dependent variable, ε is the random error term, and the value of β_i reflects the contribution of the regression factor Xi to the dependent Variable, the magnitude of which reflects the effect of X_i on Y[10].

2.3 Statistical Analysis

The collected data were analyzed using SPSS27.0 statistical software. First, a preliminary screening of some independent variables was conducted through the chi-square test, and the results were interpreted; subsequently, some independent variable indicators were eliminated, and the results were analyzed after the preliminary screening was completed. Finally, in terms of the classroom satisfaction of college students in smart classrooms in S City of Hubei Province, the multiple logistic regression analysis method was used to construct a multiple logistic regression model, and the independent variables were screened according to the significance of the model results. Since $P < 0.05$ indicates a significant difference, it is statistically significant.

3. Results

3.1 Single-Factor Analysis of Class Satisfaction in Smart Classrooms at Universities in S City of Hubei Province

A total of 742 effective samples were included in this study, with the proportions of satisfaction being very dissatisfied, relatively dissatisfied, general, relatively satisfied, and very satisfied at 0.67% (5 people), 1.75% (13 people), 12.40% (92 people), 52.29% (388 people), and 32.88% (244 people), respectively. Single-factor analysis showed that gender, major, teaching ability, interaction feedback, teaching enthusiasm, fairness and justice, course structure, resource quality, assessment mechanism, timeliness of knowledge, learning motivation, class participation, capability matching, peer influence, physical environment, technical support, and resource accessibility were significantly associated with class satisfaction in smart classrooms at colleges and universities (all $P<0.05$). In terms of gender, the overall satisfaction of female students was higher than that of male students; in terms of grade, there was no significant difference in the overall satisfaction of students from freshman to senior; in terms of major distribution, the overall satisfaction of students in medical majors was the highest, as shown in Table 1.

Table 1. Single Variable Analysis of Class Satisfaction Smart Classrooms for University Students (n=742)

Variable	Name	Student Satisfaction with Smart Classrooms (%)					χ^2/F	P price
		Extremely Dissatisfied	Not Particularly Satisfied	Generally	Fairly Satisfied	Very Satisfied		
Gender	1	6(85.71)	7(50.00)	52(32.70)	142(40.11)	109(52.40)	21.075	0.000**
	2	1(14.29)	7(50.00)	107(67.30)	212(59.89)	99(47.60)		
Grade	1	4(57.14)	8(57.14)	98(61.64)	196(55.37)	105(50.48)	20.519	0.058
	2	1(14.29)	3(21.43)	30(18.87)	75(21.19)	68(32.69)		
	3	2(28.57)	1(7.14)	25(15.72)	69(19.49)	28(13.46)		
	4	0(0.00)	2(14.29)	6(3.77)	14(3.95)	7(3.37)		
Major	1	3(42.86)	5(35.71)	57(35.85)	133(37.57)	82(39.42)	45.645	0.005*
	2	0(0.00)	1(7.14)	22(13.84)	32(9.04)	8(3.85)		
	3	0(0.00)	1(7.14)	22(13.84)	46(12.99)	24(11.54)		
	4	3(42.86)	2(14.29)	39(24.53)	62(17.51)	31(14.90)		
	5	1(14.29)	4(28.57)	5(3.14)	41(11.58)	40(19.23)		
	6	0(0.00)	1(7.14)	5(3.14)	14(3.95)	9(4.33)		
	7	0(0.00)	0(0.00)	9(5.66)	26(7.34)	14(6.73)		
Teaching Ability	1	5(71.43)	0(0.00)	1(0.63)	2(0.56)	2(0.96)	560.405	< 0.001***
	2	0(0.00)	2(14.29)	1(0.63)	2(0.56)	0(0.00)		
	3	0(0.00)	5(35.71)	21(13.21)	33(9.32)	6(2.88)		
	4	2(28.57)	4(28.57)	103(64.78)	248(70.06)	31(14.90)		
	5	0(0.00)	3(21.43)	33(20.75)	69(19.49)	169(81.25)		
Interaction Feedback	1	5(71.43)	1(7.14)	1(0.63)	2(0.56)	2(0.96)	553.937	< 0.001***
	2	0(0.00)	2(14.29)	2(1.26)	2(0.56)	1(0.48)		
	3	0(0.00)	5(35.71)	38(23.90)	35(9.89)	6(2.88)		
	4	2(28.57)	3(21.43)	88(55.35)	247(69.77)	30(14.42)		
	5	0(0.00)	3(21.43)	30(18.87)	68(19.21)	169(81.25)		
Teaching Passion	1	5(71.43)	0(0.00)	1(0.63)	3(0.85)	2(0.96)	548.018	< 0.001***
	2	0(0.00)	2(14.29)	10(6.29)	3(0.85)	3(1.44)		
	3	0(0.00)	4(28.57)	43(27.04)	50(14.12)	9(4.33)		
	4	2(28.57)	7(50.00)	78(49.06)	238(67.23)	28(13.46)		
	5	0(0.00)	1(7.14)	27(16.98)	60(16.95)	166(79.81)		
Fairness and Justice	1	5(71.43)	1(7.14)	1(0.63)	3(0.85)	1(0.48)	527.683	< 0.001**
	2	0(0.00)	2(14.29)	0(0.00)	1(0.28)	1(0.48)		
	3	0(0.00)	2(14.29)	18(11.32)	23(6.50)	3(1.44)		

	4	2(28.57)	5(35.71)	95(59.75)	232(65.54)	19(9.13)		*
	5	0(0.00)	4(28.57)	45(28.30)	95(26.84)	184(88.46)		
Course Structure	1	6(85.71)	2(14.29)	1(0.63)	3(0.85)	1(0.48)	682.933	< 0.001***
	2	0(0.00)	2(14.29)	1(0.63)	0(0.00)	0(0.00)		
	3	1(14.29)	4(28.57)	30(18.87)	31(8.76)	3(1.44)		
	4	0(0.00)	3(21.43)	89(55.97)	256(72.32)	24(11.54)		
	5	0(0.00)	3(21.43)	38(23.90)	64(18.08)	180(86.54)		
Resource Quality	1	6(85.71)	1(7.14)	1(0.63)	3(0.85)	1(0.48)	696.547	< 0.001***
	2	0(0.00)	3(21.43)	2(1.26)	7(1.98)	0(0.00)		
	3	1(14.29)	3(21.43)	54(33.96)	47(13.28)	10(4.81)		
	4	0(0.00)	4(28.57)	77(48.43)	248(70.06)	28(13.46)		
	5	0(0.00)	3(21.43)	25(15.72)	49(13.84)	169(81.25)		
Assessment Mechanism	1	6(85.71)	1(7.14)	1(0.63)	3(0.85)	2(0.96)	647.168	< 0.001***
	2	0(0.00)	1(7.14)	7(4.40)	9(2.54)	4(1.92)		
	3	0(0.00)	5(35.71)	68(42.77)	68(19.21)	11(5.29)		
	4	1(14.29)	5(35.71)	65(40.88)	232(65.54)	31(14.90)		
	5	0(0.00)	2(14.29)	18(11.32)	42(11.86)	160(76.92)		
Timeliness of Knowledge,	1	4(57.14)	0(0.00)	0(0.00)	0(0.00)	1(0.48)	682.572	< 0.001***
	2	0(0.00)	0(0.00)	3(1.89)	3(0.85)	1(0.48)		
	3	0(0.00)	5(35.71)	38(23.90)	43(12.15)	4(1.92)		
	4	2(28.57)	5(35.71)	92(57.86)	260(73.45)	28(13.46)		
	5	1(14.29)	4(28.57)	26(16.35)	48(13.56)	174(83.65)		
Learning Motivation	1	5(71.43)	2(14.29)	1(0.63)	1(0.28)	0(0.00)	707.506	< 0.001***
	2	1(14.29)	1(7.14)	10(6.29)	14(3.95)	1(0.48)		
	3	0(0.00)	6(42.86)	66(41.51)	77(21.75)	15(7.21)		
	4	0(0.00)	3(21.43)	67(42.14)	231(65.25)	29(13.94)		
	5	1(14.29)	2(14.29)	15(9.43)	31(8.76)	163(78.37)		
Class participation	1	5(71.43)	0(0.00)	2(1.26)	6(1.69)	4(1.92)	494.303	< 0.001***
	2	1(14.29)	1(7.14)	23(14.47)	36(10.17)	12(5.77)		
	3	0(0.00)	4(28.57)	81(50.94)	102(28.81)	32(15.38)		
	4	0(0.00)	6(42.86)	44(27.67)	185(52.26)	21(10.10)		
	5	1(14.29)	3(21.43)	9(5.66)	25(7.06)	139(66.83)		
Capability Matching	1	3(42.86)	0(0.00)	0(0.00)	2(0.56)	0(0.00)	565.748	< 0.001***
	2	2(28.57)	0(0.00)	2(1.26)	1(0.28)	1(0.48)		
	3	0(0.00)	3(21.43)	26(16.35)	25(7.06)	1(0.48)		
	4	1(14.29)	7(50.00)	103(64.78)	265(74.86)	31(14.90)		
	5	1(14.29)	4(28.57)	28(17.61)	61(17.23)	175(84.13)		
Peer Influence	1	4(57.14)	0(0.00)	0(0.00)	1(0.28)	1(0.48)	627.587	< 0.001***
	2	0(0.00)	1(7.14)	0(0.00)	3(0.85)	1(0.48)		
	3	0(0.00)	3(21.43)	28(17.61)	18(5.08)	1(0.48)		
	4	2(28.57)	7(50.00)	97(61.01)	275(77.68)	26(12.50)		
	5	1(14.29)	3(21.43)	34(21.38)	57(16.10)	179(86.06)		
Physical Environment	1	5(71.43)	2(14.29)	5(3.14)	2(0.56)	6(2.88)	460.856	< 0.001***
	2	0(0.00)	4(28.57)	17(10.69)	13(3.67)	3(1.44)		
	3	0(0.00)	4(28.57)	34(21.38)	41(11.58)	8(3.85)		
	4	1(14.29)	3(21.43)	72(45.28)	242(68.36)	26(12.50)		
	5	1(14.29)	1(7.14)	31(19.50)	56(15.82)	165(79.33)		
Technical Support	1	4(57.14)	0(0.00)	0(0.00)	0(0.00)	1(0.48)	649.53	< 0.001***
	2	0(0.00)	0(0.00)	4(2.52)	5(1.41)	5(2.40)		
	3	1(14.29)	5(35.71)	21(13.21)	12(3.39)	1(0.48)		
	4	0(0.00)	1(7.14)	88(55.35)	260(73.45)	20(9.62)		
	5	2(28.57)	8(57.14)	46(28.93)	77(21.75)	181(87.02)		

Resource Accessibility	1	5(71.43)	0(0.00)	1(0.63)	0(0.00)	1(0.48)	762.781	< 0.001***
	2	0(0.00)	2(14.29)	0(0.00)	1(0.28)	0(0.00)		
	3	0(0.00)	3(21.43)	27(16.98)	26(7.34)	5(2.40)		
	4	1(14.29)	6(42.86)	96(60.38)	259(73.16)	17(8.17)		
	5	1(14.29)	3(21.43)	35(22.01)	68(19.21)	185(88.94)		

Notes: $*P<0.05$, $**P<0.01$, $***P<0.001$

3.2 Hubei Province S City University Student Smart Classroom Class Satisfaction Multivariate Logistic Regression Analysis. Take the satisfaction of university students with smart classroom teaching as the dependent variable (1.0 = very dissatisfied, 2.0 = relatively dissatisfied, 3.0 = general, 4.0 = relatively satisfied, 5.0 = very satisfied), gender (male = 1, female = 2), major (medical specialty = 1, law specialty = 2, economics specialty = 3, pedagogy specialty = 4, equipment manufacturing specialty = 5, electronic information specialty = 6, art design specialty, etc. = 7), and four aspects of 15 variables such as teacher factors, teaching quality, Student-related factors, teaching environment, etc. are assigned value s by grade and included in the multivariate Logistic regression model, see Table 2 for details.

Table 2. Variable Assignment Description

Classify	Variable	Variable name	Assignment explanation	Type of variable
Satisfaction	College Student Smart Classroom Satisfaction Survey	Y	1.0 = very dissatisfied, 2.0 = relatively dissatisfied, 3.0 = general, 4.0 = relatively satisfied, 5.0 = very satisfied	Dependent variable, continuous variable
Personal Characteristics	gender	X1	(male = 1, female = 2)	Categorical variable
	major	X2	medical specialty = 1, law specialty = 2, economics specialty = 3, pedagogy specialty = 4, equipment manufacturing specialty = 5, electronic information specialty = 6, design specialty= 7	Categorical variable
Teacher Factors	Teaching Ability	X3	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Interaction Feedback	X4	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Teaching Passion	X5	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Fairness and Justice	X6	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
Teaching Quality	Course Structure	X7	1.0 = Highly unreasonable 2.0 = Somewhat unreasonable 3.0 = Average 4.0 = Somewhat reasonable 5.0 = Highly reasonable	Continuous variable
	Resource Quality	X8	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Assessment Mechanism	X9	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Timeliness of Knowledge	X10	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
Student-related factors	Learning Motivation	X11	1.0=Very low, 2.0=Fairly low, 3.0=Average, 4.0=Fairly high, 5.0=Very high	Continuous variable
	Class participation	X12	1.0=Very low, 2.0=Fairly low, 3.0=Average, 4.0=Fairly high, 5.0=Very high	Continuous variable
	Capability Matching	X13	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable

	Peer Influence	X14	1.0=Very low, 2.0=Fairly low, 3.0=Average, 4.0=Fairly high, 5.0=Very high	Continuous variable
Teaching Environment	Physical Environment	X15	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Technical Support	X16	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable
	Resource Accessibility	X17	1.0 = Very poor 2.0 = Poor 3.0 = Average 4.0 = Good 5.0 = Excellent	Continuous variable

The results of the multiple logistics regression analysis show that the R-square value of the model is 0.488, which means that teaching ability, interaction feedback, teaching enthusiasm, fairness and justice, curriculum structure, resource quality, assessment mechanism, knowledge cutting-edge, learning motivation, class participation, capability matching, peer influence, physical environment, technical support, and resource accessibility can explain 48.8% of the reasons for the change in classroom satisfaction. When the model is subject to F-test, the model passes the F-test ($F=40.572$, $p=0.000<0.05$), and the summary analysis shows that teaching ability, teaching enthusiasm, curriculum structure, assessment mechanism, learning motivation, capability matching, physical environment, and resource accessibility will have a significant positive impact on classroom satisfaction, while fairness and justice will have a significant negative impact on classroom satisfaction. However, interaction feedback, resource quality, knowledge cutting-edge, Class participation, peer influence, and technical support will not affect the relationship with classroom satisfaction. The analysis results are shown in detail in Table 3.

Table 3. Multivariate linear regression Analysis Results (Dependent Variable = satisfaction; n=742)

	Non-standardization coefficient		Standardized Coefficient	t	P price	95% CI
	B	Standard error	Beta			
Constant	0.567	0.179	-	3.164	0.002**	0.215 ~ 0.919
Gender	-0.138	0.045	-0.084	-3.095	0.002**	-0.226 ~ -0.050
Teaching Ability	0.154	0.069	0.141	2.21	0.027*	-0.290 ~ -0.017
Teaching Passion	0.112	0.045	0.117	2.475	0.014*	0.023 ~ 0.202
Fairness and Justice	-0.131	0.055	-0.12	-2.374	0.018*	-0.239 ~ -0.023
Course Structure	0.174	0.053	0.166	3.301	0.001**	0.070 ~ 0.277
Assessment Mechanism	0.12	0.035	0.13	3.388	0.001**	0.050 ~ 0.189
Learning Motivation	0.133	0.039	0.143	3.367	0.001**	0.055 ~ 0.210
Capability Matching	0.141	0.05	0.119	2.794	0.005**	0.042 ~ 0.240
Physical Environment	0.14	0.027	0.164	5.154	< 0.001***	0.087 ~ 0.193
Resource Accessibility	0.169	0.049	0.148	3.425	0.001**	0.072 ~ 0.266

*$P<0.05$, **$P<0.01$, ***$P<0.001$

4. Conclusions and Strategies

4.1 Discussion

This study, through the investigation of the satisfaction of university students in smart classrooms in S city of Hubei Province, finds that the satisfaction of university students in smart classrooms in S city of Hubei Province, is relatively high at present (the average score is 4.14), among which the teaching ability, teaching enthusiasm, curriculum structure, learning motivation, and physical environment of teachers and students have a significant impact on the satisfaction of university students in smart classrooms. Specifically, it is mainly reflected in the following aspects:

(1) From the perspective of teachers, teaching ability and teaching enthusiasm had a positive effect on the satisfaction of smart classroom among college students. The ability of teachers to apply information technology in smart classroom directly affected the teaching effectiveness, and the teachers who are skilled in the use of smart teaching tool platform could optimize the presentation of teaching content and classroom interaction, so as to improve the learning experience and satisfaction of students.

In addition, the teaching design ability of teachers determines the organization and presentation of course content, excellent teaching design could stimulate students' interest in learning, enhance the attractiveness of the classroom, and thus improve satisfaction. However, the fairness and justice had a negative effect on the satisfaction of smart classroom among college students. One possible reason is that the technology-enabled features of smart classroom (e.g., immediate feedback, data analysis) are used by teachers for differentiated evaluation (labeling a specific student as "low potential"), which may trigger students' resistance to the technology tools and destroy the trust atmosphere in the classroom, thus reducing satisfaction.

(2) From the perspective of teaching quality, the curriculum structure and assessment mechanism have a positive impact on the satisfaction of smart classroom among college students. The smart classroom enhances the classroom experience of students by optimizing the curriculum structure design, provides diverse learning materials and tools, and meets the learning needs of students, thus improving learning satisfaction. At the same time, the process-oriented assessment and diversified evaluation mechanism of the smart class room strengthen the attention to the learning process, promote the learning effectiveness of students, and thus improve student satisfaction.

(3) From Student-related factors, learning motivation, class participation, capability matching and peer influence have a positive impact on students' satisfaction with smart classroom. Learning motivation can stimulate students' interest in learning and their willingness to participate. Class participation directly or indirectly affects satisfaction. Capability matching ensures that learners can effectively use the smart class room resources. Peer influence enhances the learning experience through social interaction and cooperative learning. The combined effect of these factors provides an important basis for improving the learning outcomes and satisfaction in smart classrooms.

(4) From the perspective of the teaching environment, the physical environment, technical support, and resource accessibility positively influence students' satisfaction with smart classrooms. A good acoustic environment, appropriate lighting environment, and comfortable desk and chair arrangement can enhance learners' comfort, thereby increasing their willingness to use smart classrooms and their satisfaction. The performance of technical facilities such as teaching display devices, networks and terminals, and intelligent auxiliary devices directly affects the learning experience. Resource accessibility is another important factor affecting smart classroom satisfaction. The richness and accessibility of resources can meet students' learning needs, thereby enhancing their learning experience and satisfaction.

4.2 Improvement Countermeasures

4.2.1 Enhance teacher effectiveness, optimize teaching interaction, and improve professional quality

In the construction of smart classrooms, the professional quality and teaching enthusiasm of teachers are key factors determining the effectiveness of classroom teaching. The primary task is to strengthen the t raining of teachers' information technology teaching ability, so that they can proficiently use various smart teaching tools such as online collaboration platforms and intelligent writing systems, thereby providing strong support for students' personalized learning. At the same time, teachers should focus on classroom interaction design, through heuristic questioning, group discussions and instant feedback and other diversified teaching methods, to stimulate students' interest in learning and enthusiasm for participation. In addition, the teaching attitude of teachers directly affects the classroom atmosphere, and a positive and optimistic teaching mood can effectively enhance students' learning motivation and classroom participation.

4.2.2 Strengthen teaching design to improve the quality and adaptability of courses

Course quality is a key element affecting the effectiveness of smart classrooms. Teachers need to carefully design teaching plans, fully consider the characteristics of smart classrooms, and organically combine teaching for ms such as online discussions, project-based learning, and personalized tasks to meet the learning needs of students at different levels. In terms of curriculum setting, it is necessary to focus on the combination with students' points of interest and actual needs, optimize students' learning experience by introducing high-quality digital resources and innovative teaching tools, and

establish a scientific teaching effect evaluation mechanism. At the same time, by using intelligent analysis tools to monitor students' learning situation in real time and adjust teaching strategies promptly according to feedback, a virtuous cycle of teaching improvement mode is formed.

4.2.3 Nurturing learning ability and enhancing students' self-directed learning and sense of efficacy

Students' self-management ability and learning consciousness are important factors affecting the effect of smart classrooms. Firstly, students should actively improve their autonomous learning ability, make full use of various learning resources provided by smart classrooms, such as online English reading materials and intelligent writing platforms, to achieve personalized learning and ability improvement. Secondly, it is necessary to focus on cultivating a sense of learning effectiveness, to accumulate successful experience and build confidence in learning by actively participating in interactive teaching activities and obtaining timely learning feedback. At the same time, students should maintain good learning engagement, actively participate in classroom interactions, and establish a good cooperative relationship with teachers and classmates, so as to achieve better learning outcomes.

4.2.4 Optimize the teaching environment and build smart learning spaces

The creation of a teaching environment is crucial for the success of a smart classroom. In terms of hard ware facilities, advanced teaching equipment should be equipped, and the acoustic and visual environment of the classroom should be optimized to create comfortable learning conditions for students. In terms of environmental design, the dominant position of students should be highlighted, and through intelligent technology support, more opportunities should be provided for students to showcase their talents and enhance their comprehensive abilities. At the same time, the classroom atmosphere should be emphasized, and an open and inclusive learning environment should be created by promoting teacher-student interaction and student-student collaboration, so as to effectively enhance students' classroom engagement and satisfaction.

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References

[1] Cao Zhihong, Ke Feng, Kang Tonglin. The Current Situation and Development Path of Smart Classroom in Shaanxi Colleges and Universities Based on Three-dimensional Main Body Perspective. Exploration. Journal of Xi'an University of Science and Technology (Social Science Edition), 2022, 32(02): 118-128.

[2] Wang Anqi. Research on the Experience of University English Teachers and Students Using Smart Classrooms. China University of Geosciences Educati on, 2021, 30 (03): 95-99. DOI:10.16244/j.cnki.1006-9372.2021.03.017.

[3] Zhang Jingjing. Research on the Factors Influencing the Acceptance of Smart Classrooms by College Students. Journal of Hubei Adult Education College, 2023, 29 (01): 76-81+104. DOI:10.16019/j.cnki.cn42-1578/g4.2023.01.014.

[4] LIU Xiaoyu. Practice Research on Middle School Intelligent Classroom Teaching Model. Zhengzhou University, 2021.DOI:10.27466/d.cnki.gzzdu.2021.002069.

[5] Wang Yin. Establishing a Feedback Evaluation System for Smart Classroom Usage Based on Student Experience. Education and Teaching Forum, 2023, (25): 54-57. DOI: CNKI: SUN: JYJU.0.2023-25-014.

[6] Lin Li, Li Jing, Fu Tongjie. Factors Influencing Learning Satisfaction in Smart Classrooms and Enhancement Strategies. Teaching and Management Sun, 2021, (06): 29-32. DOI: CNKI: SUN: JXGL.0.2021-06-009.

[7] Wang Xinxin, Tan Zheng. Influencing Factors and Enhancement Strategies of Student Satisfaction in University Classroom Teaching. Education Review Discussion, 2016, (07): 40-43. DOI: CNKI: SUN: JYPL. 0.2016-07-011.

[8] Li Wenjing. Study on Factors Influencing and Enhancement Strategies for College Students' Learning Engagement in Smart Learning Environments. Changchun Normal University, 2025. DOI: 10.27709/d.cnki.gccsf.2025.000254.

[9] Shi Qinyu, Yang Yi, Wang Wenqing, et al. Research on Strategies to Enhance College Students' Online Learning Satisfaction from the MOA Perspective. Educational Information Technology, 2025, (Z2): 20-24. DOI: CNKI: SUN: JYUX.0.2025-Z2-004.

[10] Ji Xianpei. Research on the Influencing Factors of Class Teachers' Job Satisfaction—Based on CEPS (2013-2014) Data Analysis Analysis. Education Observation, 2021, 10(31): 17-19+40.