The Impact of Online Teaching Model on Learning Effectiveness of High School Students in Chongqing

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Abstract

The purpose of this research was: 1)to study the impact of online teaching mode on students' academic achievement and satisfaction. 2) To study and evaluate the success of online teaching models in promoting student engagement, motivation, and academic achievement.3) To study the impact of technology infrastructure on students' learning outcomes. The sample group focuses explicitly on teachers working in secondary schools. The sample size was determined by using Krejcie and Morgan tables. Using purposive and simple random sampling techniques. There are 316 samples. The tool used in this study was a 5-item scale questionnaire with a Cronbach's alpha reliability of 0.89. The statistics used for data analysis were frequency distribution, percentage, mean, standard deviation, and multiple linear regression analysis.

The research findings revealed that: First, the level of student engagement is a key factor affecting the effectiveness of the flipped classroom model. Second, this study emphasizes the significance of teacher support in the success of online teaching models. Teachers who

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provide clear guidance, feedback, and support are more effective in implementing the model. Third, this study highlights the critical role of school technology infrastructure in the effectiveness of online teaching models. Reliable and fast Internet access, as well as access to devices such as laptops or tablets, are essential for students to participate in the flipped classroom. Finally, the study's results suggest that the online classroom model can be an effective tool for improving the academic performance of Chongqing high school in China.

Keywords: online teaching model; influencing factor; teaching effect

Introduction

With the advent of the knowledge economy, students' learning mode has been impacted in an unprecedented way, and various new learning modes have emerged. Among all the learning modes, the most impactful one is network-based learning, which emerged with the development of network technology. It is a brand-new way for students to learn online by establishing an educational platform on the Internet. This online learning mode is a brand-new learning environment comprising multimedia network learning resources, an online learning community, and a network technology platform. Compared with other learning modes, it has incomparable advantages. The education industry promoted distance education ten years ago, realizing remote video teaching and electronic document sharing through the Internet virtual classroom, which allowed teachers and students to interact with each other online during the teaching and learning process. With the advent of the 5G era, online education can be completed not only on computers, but also on

smartphones that are convenient to carry around. With the rapid development of 5G networks, students can learn online more conveniently and directly through handheld devices such as mobile phones, and the wireless network enables more effective daily interactions.

China, with a large population, is a vast country with a relatively well-developed education system. However, there are still many problems in education, and there is a strong hope for high-quality and high-level education. With the development of the times, the traditional teaching mode has been unable to keep pace. Although the online education model has a long history, and some schools in certain parts of China follow more advanced and cutting-edge educational models, there are still many disadvantages to online education. For example, there are technical problems in online education. Due to the limited professional level of the Internet industry, there are technical deficiencies in overcoming the drawbacks of the Internet, such as the disclosure of user information or the lax review of online education content. Students' learning efficiency and control are poor. In the traditional education mode, face-to-face teaching between teachers and classmates can remind students on the spot. In contrast, online education involves teachers and students at both ends of the network, and students' learning scenes are often more casual, which inevitably leads to many situations of low learning efficiency. The nature of the subject imposes limitations on the subject content in online education. Currently, most online education modes in China primarily focus on English subjects, emphasizing memorization. Like other experimental and professional subjects, online education has more

obvious advantages than traditional education. Therefore, it is crucial to investigate the impact of online teaching mode on the learning outcomes of senior high school students in China.

Research Objective

1. Evaluate the impact of students' participation in online teaching on the academic performance of high school students.

2. Evaluate the effectiveness of teacher-supported online teaching models in promoting student engagement, motivation, and academic success.

3. Investigate the influence of technological infrastructure on student performance within the classroom environment.

Research hypothesis

H1: The higher the students' participation in online teaching mode, the more significant the learning effect.

H2: Teachers' support for online teaching mode will have a positive impact on students' learning.

H3: The technical infrastructure will significantly impact the effectiveness of the online teaching mode in promoting students' academic performance.

Literature review

1. Concept and Theory of Online Teaching

Online education, also known as distance education or online learning, refers to the learning behavior facilitated by a network. Online education differs significantly from traditional face-to-face teaching, which relies on direct interpersonal interaction as its primary form. It is a media-

based education and teaching practice that separates time and space between teachers and students, rather than simply replicating the traditional classroom. Teaching behavior is a continuous and direct interaction between people, encompassing two key processes: teaching and learning. The quality of education and teaching activities mainly depends not on whether teachers present clearly, but on whether teaching behavior effectively promotes learning behavior, and on the degree and effect of interaction between teaching behavior and learning behavior. With the separation of time and space, the key point of online teaching is how to ensure that the teaching behavior effectively promotes learning behavior.

2. Concept and Theory of Student Engagement

The concept of job engagement, which originates from positive psychology and represents a broad notion, serves as the foundation for student engagement. The concept of learning engagement emerges when the research field of work engagement expands to include the realm of learning.

In the 1970s and 1980s, researchers began to focus on students' willingness to invest in their education and academic pursuits, and the concept of student engagement started to gain traction in the academic field. Currently, in Western countries, students' involvement in research has become an important area of focus in pedagogy and educational psychology, yielding remarkable results. However, in the research in this field, the views and studies from the Western world are dominant, and there are few studies in this area.

Numerous studies have demonstrated that student involvement is closely linked to students' academic achievements, and researchers concur that student involvement can yield positive outcomes for students. However, due to the differing philosophical views held by researchers, there is a problem in defining the concept of "student involvement." Some researchers define "student engagement" as students' behavior, such as study effort, resource utilization, and study time, while others focus on understanding "student engagement" as something related to social and cultural background, including emotional experiences, sense of belonging, and respect. Furlong et al. (2003) and Jimerson, Campos, & Greif (2003) describe "student involvement" as students' positive cognition and emotions towards school, teachers, and peers, as well as their participation in school-related activities and learning. Kuh (2001) defined "student input" broadly. He believed that student input encompasses two aspects: one is the time and energy that students invest in activities with educational goals, and the other is the effective educational practices adopted by schools. Fredericks et al. (2004) argue that "student engagement" is a multi-level concept, encompassing three key characteristics: behavioral, emotional, and cognitive. Although researchers define students' engagement from different angles, the discussions of various researchers essentially focus on the same aspect: studying students' personal behavior, experiences, and engagement in the learning process to find the relationship between students' engagement and academic performance.

3. Concept and theory of Teacher support

Teacher support refers to the assistance and guidance provided by teachers during the process of students' learning and growth. Teacher support is not only to impart knowledge, but also includes psychological, emotional, and behavioral support to help students overcome difficulties and improve their self-confidence and learning ability. Teacher support also includes encouragement, guidance, evaluation, and feedback, enabling students to make continuous progress in their studies. The importance of teacher support lies in its ability to promote students' interest and motivation in learning, improve learning outcomes and grades, and also enhance students' self-awareness and development. Therefore, teacher support is an indispensable part of education.

Qiangqiang Ma (2021) believes that teachers' support for initiative is crucial in achieving the appropriate four-point division of learning results. It is regarded as a specific and stable support resource for learners, and the flexible style supported by teachers has a strong predictor of educational achievement.

Yanfei Yang (2021) and others have studied students' math scores with the support of their teachers. The results indicate that academic self-efficacy serves as an intermediary role between teachers' emotional support and the math scores of male and female students in China. Furthermore, the relationship between teachers' emotional support and students' math performance is mediated through academic self-efficacy and math behavior.

Marta Miklikowska (2019) studied the influence of teacher support on Swedish youth's anti-immigrant attitudes and tested whether social trust

could moderate these influences. The results indicate that teacher support is associated with a limited number of prejudices, but it is also linked to fluctuations in teenagers' emotional states. They think teachers support their views more than their peers.

4 Concept and Theory of Technology Infrastructure

An essential component of contemporary teaching methods is the technology infrastructure. The idea and philosophy behind technology infrastructure in education refers to the real and virtual resources needed to facilitate the efficient use of technology in teaching and learning. The hardware, which includes computers, tablets, and other devices, as well as the software and systems that facilitate communication, collaboration, and learning management, make up the technical infrastructure in education. Networks and Internet access are also crucial components of the educational technology infrastructure. Reliable and secure systems are essential, according to the theory of technology infrastructure in education. To prevent unauthorized access to student and teacher data, educational institutions must ensure their digital infrastructure is robust and secure.

Online education is a new educational model that leverages the Internet of Things, cloud computing, wireless communication, and other emerging information technologies, connecting things, enabling intelligence, perception, and personalization. In a broad sense, the scope of innovative education is not limited to educational informatization itself, but rather from the perspective of technological innovation, focusing on how emerging technologies can promote educational equity, enhance the

quality and effectiveness of education, and ultimately upgrade the new ecology of innovative education.

Methodology

1. Population and sample

The population consists of 2,848 students from all senior high schools in Chongqing, China.

The sample group is students in senior high schools in Chongqing City, China. The sample size used in this questionnaire was determined using Krejcie and Morgan tables, which employed both purposive sampling and simple random sampling. The sample size is 316.

2. Research instrument

During the data collection process, the questionnaire is divided into five grades: highest, high, medium, low, and very low. The researcher divides the questionnaire into two parts:

The first part involves setting up several choices to investigate the quality of participants' answers.

The second part is the influence of online teaching mode on the learning of senior high school students in Chongqing. The questionnaire survey sets the evaluation style to five levels, and mainly analyzes the following aspects:

Student engagement

Teacher support

Technology infrastructure in the school

Online teaching model

3. Validation of the test

To verify accuracy, the researcher will utilize these suggestions to enhance the questionnaire, making it more comprehensive and taking into account the language and study topic. There are three tiers of conformity assessment criteria, which are as follows: the evaluation scores from experts' IOC (Index of Item-Objective Congruence) assessments are used to analyze the index values between questions and research objectives in order to apply the results collected to enhance the questionnaire.

+1 implies ensuring that the question relates to the study's substance

0 implies Not sure if the question relates to the study's topic.

-1 implies that the inquiry is not in line with the study's findings

The LOC findings can be summarized as follows: two standard requirements.1) The question is legitimate by the subject examined if the computed LOC value is more than or equal to 0.50.

2) The question is invalid by the material investigated if the computed LOC value is less than 0.50.

Conceptual Framework
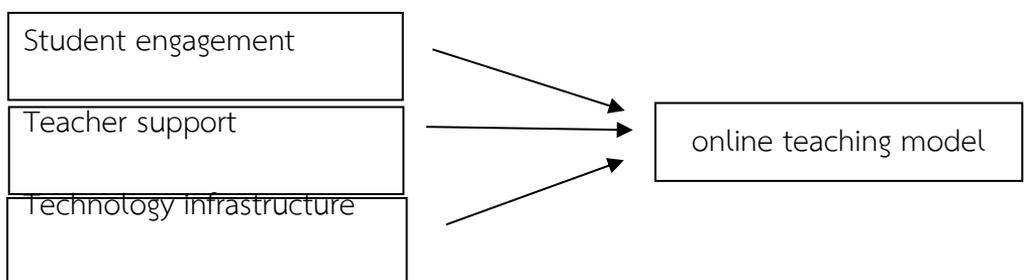
Result

This research aims to investigate the Influence of the online teaching model on the learning effect in senior High schools in Chongqing, China.

The researcher studied students in senior high schools, classified by Gender, Age, Class level, and Major of education.

Part 1: Demographic Data Analysis

Gender	Frequency	Percent
Male	167	52.8
Female	149	47.2
Total	316	100

Age	Frequency	Percent
16 years old	105	33.2
17 years old	107	33.8
18 years old	104	32.9
Total	316	100

Class level	Frequency	Percent
Year 1	105	33.2
Year 2	107	33.8
Year 3	104	32.9
Total	316	100

Major of course	Frequency	Percent
Chinese	97	30.6
Math	106	33.5
English	113	35.7

Total	316	100

The respondents are students in senior High schools in Chongqing, China. Most are Male, 52.8 percent. The age is 17 years, which is 33.8 percent. The class level is Year 2, 33.8 percent. Moreover, the major, of course, is English, at 35.7 percent.

Part 2: The descriptive statistics of Factors that influence the online teaching Model on the Learning Effect of senior High schools in Chongqing, China.

Student engagement	x	S.D.	Significant	CV%	Level
Online teaching models are an effective way to increase student engagement	4.21	.837	Agree	21.57	4
Online teaching models are better than traditional classrooms in promoting student engagement	3.86	.902	Agree	22.91	3
Students who are more engaged in the Online teaching model perform better academically	4.14	1.035	Agree	23.41	3
The online teaching model provides more opportunities for student engagement than the traditional	3.87	.923	Agree	23.01	2
The use of technology in Online teaching model classrooms enhances student	4.30	.892	Agree	24.63	5
Total	**4.09**	**.962**	**Agree**		

The Table shows the students' engagement influenced by the Online Teaching Model on the learning effect in senior High schools in Chongqing, China. It is agreed, as analyzed by the level of CV, that the Online Teaching Model provides more opportunities for student engagement than traditional teaching. Students who are more engaged in the Online Teaching Model perform better academically., Online Teaching Models are better than traditional classrooms in promoting student engagement. Online Teaching Models are an effective way to increase student engagement, and the use of technology in flipped classrooms enhances student engagement, respectively.

Teacher support	x	S.D.	Significant	CV%	Level
Teacher support is critical to the success of the Online teaching classroom model.	4.51	.936	Agree	21.62	3
Teachers who provide clear instructions and guidance are more effective in implementing the Online teaching classroom model.	4.17	.923	Agree	22.51	2
Teacher feedback and support are essential for Online teaching and	4.39	1.041	Agree	22.34	2

	x	S.D.		CV%	
classroom student engagement.					
Teachers who are enthusiastic about the Online teaching classroom model can positively influence student engagement.	4.51	.903	Agree	18.62	5
Teacher support and involvement can help struggling students adapt to the Online teaching model.	4.28	.845	Agree	20.25	4
Total	4.39	.947	Agree		

The Table shows the Teacher Support that influences the Online Teaching Model on the learning effect in senior High schools in China. It is agreed that, based on the level of CV, Teachers who provide clear instructions and guidance are more effective in implementing the Online Teaching model. Teacher feedback and support are essential for Online Teaching student engagement. Teacher support is critical to the success of the Online Teaching model. Teacher support and involvement can help struggling students adapt to the Online Teaching model. Teachers who are enthusiastic about the Online Teaching model can positively influence student engagement, respectively.

Technology infrastructure in schools	x	S.D.	Significant	CV%	Level

The quality and availability of technology in the school affect the success of the Online classroom model.	4.27	.973	Agree	21.63	5
Online classrooms require reliable and fast internet access to function effectively.	3.95	.899	Agree	22.94	4
Access to devices like laptops or tablets is essential for students to participate in Online classrooms.	4.38	.812	Agree	20.16	6
Technology problems, such as internet connectivity issues or software malfunctions, can negatively impact the effectiveness of the Online classroom model.	3.73	.953	Moderate	28.73	1
Technology infrastructure in the school enhances the effectiveness of Online classrooms.	4.35	1.062	Agree	21.89	4
Teachers with access to quality technology and resources can provide a more engaging and practical Online classroom experience.	4.53	.981	Agree	22.49	5
A lack of technology infrastructure can hinder teachers' ability to implement the Online	3.99	.903	Agree	23.19	5

classroom model effectively.					
The use of technology in Online classrooms has the potential to improve student engagement and learning outcomes	3.31	.823	moderate	24.68	2
Total			**Agree**		

Table 7 presents the Technology Infrastructure in Schools that influences the Online Teaching Model on the learning effect in senior High schools in China. It is agreed, analyzed by the level of C.V., Technology problems, such as internet connectivity issues or software malfunctions, can negatively impact the effectiveness of the Online Teaching Model, The use of technology in Online Teaching Model classroom has the potential to improve student engagement and learning outcomes, Online Teaching Model classrooms require reliable and fast internet access to function effectively., A well-equipped technology infrastructure in the school can enhance the effectiveness of Online Teaching Model classrooms., The quality and availability of technology in the school affect the success of the flipped classroom model. A lack of technology infrastructure can hinder the ability of teachers to implement the Online Teaching model effectively., Teachers with access to quality technology and resources can provide a more engaging and practical Online Teaching Model classroom experience. Access to devices like laptops or tablets is essential for students to participate in Online Teaching Model classrooms.

Online Teaching Model	x	S.D.	Significant	CV%	Level
The online teaching model has enhanced my academic performance in the classroom.	4.07	.897	Agree	21.64	6
The Online teaching model has enhanced my understanding and retention of course material.	4.63	.824	Very agree	17.65	9
The Online teaching model has improved my critical thinking skills	4.27	.846	Agree	22.16	5
I feel more engaged and involved in the learning process in an Online teaching model classroom.	3.97	.965	Agree	26.43	4
The Online teaching model classroom has given me more opportunities to ask questions and seek clarification.	3.27	1.006	Moderate	32.49	2
I can learn at my own pace in an Online teaching model classroom.	4.37	.924	Very agree	21.89	8

The Online teaching model has helped me take more ownership of my learning.	4.19	.859	Agree	21.37	7
The Online teaching model has better prepared me for assessments and exams.	3.24	.937	Moderate	27.64	2
The Online teaching model can be a valuable tool for improving student learning outcomes.	4.59	.842	Very agree	17.56	8
Overall, I am satisfied with my experience in an Online teaching model classroom.	4.09	.986	Agree	23.79	4
Total	4.01	.983	Agree		

The Table shows factors that influence the Online teaching Model Classroom on the Learning Effect of senior High schools in China. It is agreed, analyzed by the level of C.V. The Online teaching Model classroom model has given me more opportunities to ask questions and seek clarification., The Online teaching Model classroom model has better prepared me for assessments and exams., I feel more engaged and involved in the learning process in a flipped classroom., Overall, I am satisfied with my experience in an Online teaching Model classroom., The Online teaching Model classroom model has improved my critical thinking skills., Online teaching Model classrooms have improved my academic performance., The Online teaching Model classroom model has helped

me to take more ownership of my learning., I can learn at my own pace in an Online teaching Model classroom., The Online teaching model can be a valuable tool for improving student learning outcomes, and it has enhanced my understanding. Respectively.

Part 3: The inferential statistics investigate the Influence of the Online teaching Model on the learning effect in senior High schools in China.

The analysis of the correlation

The researcher analyzed the relationship between the respondents' demographic information and an Online teaching Model classroom on the learning effect in senior High schools in Chongqing, China. To determine academic achievement, the researcher used One-way ANOVA; the findings are presented in the Table.

3.1 Analysis of gender by One-way ANOVA

	Sum of squares	df	Mean square	F	p-value
Between group	.049	1	.034	.178	.473
Within group	58.986	309	.165		
Total	59.013	316			

H0: The gender difference is no difference in the Online Teaching Model on the Learning Effect of senior High schools in Chongqing, China.

H1: The gender difference is a difference in the Online Teaching Model on the Learning Effect of senior High schools in Chongqing, China.

The Table shows that the One-Way ANOVA statistical test result indicates no significant difference in the outcome of the online teaching

model for genders on the Learning Effect of senior High schools in Chongqing, China. The p-value of .486 shows that the results are insignificant, leading to the acceptance of the null hypothesis and rejection of the alternative hypothesis.

3.2 Analysis of age by One-way ANOVA

	Sum of squares	df	Mean square	F	p-value
Between group	.021	8	.091	.049	.841
Within group	57.043	312	.169		
Total	56.958	316			

(I) Age	(J) Age	Mean difference (I-J)	Std. error	Sig.	95% Confidence Interval	
					Lower bound	Upper bound
16 years old	17 years old	-.02249	.07846	.946	-.2181	.1721
	18 years old	-.02371	.07763	.952	-.2192	.1716
17 years old	16 years old	.02236	.07846	.946	-.1746	.2173
	18 years old	-.00049	.05030	1.000	-.1239	.1209
18years old	16 years old	.02374	.07763	.952	-.1846	.2049
	17 years old	.00134	.07846	1.000	-.1228	.1243

H0: The age difference is no difference in Online Teaching Model classrooms on the Learning Effect of senior High schools in Chongqing, China.

H1: The age difference is a difference in Online Teaching Model classrooms on the Learning Effect of senior High schools in Chongqing, China.

Part 4 Multiple regression data analysis to investigate the Influence of the Online Teaching Model and Classroom Teaching Model on the Learning Effect of senior High schools in Chongqing, China.

In this section, the researcher examined the essential elements that affect the investigation of the Influence of online teaching model classrooms on the learning effect in senior High schools in Chongqing, China. These factors included family socioeconomic status. Differences in Educational Opportunities, Pricing, Delivery, Child's Learning Behavior, and Parents' Educational Background.

Step 1: The Value showing the relationship between independent variables positively influenced by the Online Classroom Teaching Model on the Learning Effect of senior High schools in Chongqing, China. See the Table.

Model	R	R square	Adjust R-squared	Standard error in the estimate	Dublin-Watson
1	.796*	.764	.721	.98624	1.349

Table Present Analysis of the predictive ability of the independent variable and dependent variable as follows:

1) Able to predict the independent variables (X) from the dependent variable (Y) by correlation coefficient (R)=.796

2) The influence of independent variables (X) on the dependent variable (Y) by coefficient R Square (R2)=76.4 %

3) The factors of independent variables consist of 5 factors, the analysis of factors uses Adjusted R Square =72.1%

Independent variable	B	S.E.	β	t	p	Zero-Order	Tolerance	VIF
Constant	1.0316	.159		6.796	.000*			
Student engagement	.147	.051	.183	3.400	.000*	.271	.832	1.197
Teacher support	.198	.024	.271	2.456	.000*	.243	.439	1.107
Technology Infrastructure in the school	.153	.043	.138	2.763	.004*	.216	.710	1.082

a) Dependent Variable: Online Teaching Model Classroom

b) Linear Regression through the Origin

The Table presents factors investigating the Influence of the Online Teaching Model Classroom on the learning effect in senior High schools in Chongqing, China.

Conclusion

The study investigated the influence of the online classroom teaching model on learning outcomes in senior high schools in Chongqing, China. The study's respondents were students enrolled in senior high schools, the majority of whom were male and over 17 years of age. The study examined the factors that influence the effectiveness of the Online Teaching Model classroom, including student engagement, teacher support, and school technology infrastructure. The study's results showed that the Online Teaching Model Classroom had a positive impact on the learning outcomes of students in senior high schools in Chongqing, China. Specifically, the study found that the Online Teaching Model Classroom provided more opportunities for student engagement than traditional classroom models. In addition, the study found that students who are more engaged in the Online Teaching Model Classroom perform better academically. The study also found that teacher support is a critical factor in the success of the Online Teaching Model Classroom; teachers who provide clear instructions and guidance are more effective in implementing it. Additionally, teacher feedback and support are crucial for student engagement in the Online Teaching Model Classroom. The study also found that the technology infrastructure in schools is another important factor affecting the effectiveness of the Online Teaching Model Classroom. The study found that the Online Teaching Model Classroom

requires reliable and fast internet access to function effectively. The use of technology in the Online Teaching Model Classroom has the potential to improve student engagement and learning outcomes. A well-equipped technology infrastructure in the school can enhance the effectiveness of the Online Teaching Model Classroom. The statistical analysis of the study revealed no significant difference in the outcome of the Online Teaching Model Classroom by gender, indicating that the effectiveness of the Online Teaching Model Classroom is not influenced by gender.

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