Factors Affecting Online Teaching and Learning among Chinese High School Students: Education Equality Perspectives

Jinzhu Shi[1] & Thitinant Wareewanich[1,*]

[1]Chakrabongse Bhuvanarth International Institute for Interdisciplinary Studies (CBIS), Rajamangala University of Technology Tawan-OK, Bangkok, 10310, Thailand

*Correspondence: Chakrabongse Bhuvanarth International Institute for Interdisciplinary Studies (CBIS), Rajamangala University of Technology Tawan-OK, Bangkok, 10310, Thailand. E-mail: thitinant_wa@rmutto.ac.th

Received: December 3, 2023 Accepted: January 31, 2024 Online Published: February 13, 2024

doi:10.5430/jct.v13n1p206 URL: https://doi.org/10.5430/jct.v13n1p206

Abstract

Online learning is significant to promote education equality in high school sector. This research aims to explore the factors affecting students' acceptance of online learning, construct a structural equation model of high school students' online learning behavior, and propose measures to promote educational equity. The study employed quantitative research methods, utilizing online questionnaires to gather 633 data from high school students in Dazhou, Bazhong, and Liangshan regions. A comprehensive approach to data analysis was adopted, including descriptive statistical analysis, reliability and validity tests, confirmatory factor analysis, structural equation modeling, and path analysis. Key findings revealed the significant influence of online teaching quality and course content on students' perceived usefulness, ease of use, subjective norms, attitudes towards online learning, and their subsequent learning intentions and behaviors. The study confirmed the mediating roles of these perceptions and attitudes in shaping students' engagement with online learning platforms. In conclusion, the research provides vital insights into the dynamics of online education in a high school setting. It highlights the need for enhanced teaching quality and course design to improve online learning experiences. The findings offer valuable implications for educators, policymakers, technology developers, and other stakeholders, emphasizing the importance of a collaborative approach to create more effective and equitable online learning environments. This study lays a foundation for future research and strategies aimed at optimizing the potential of online education, ensuring it is accessible and beneficial to all students.

Keywords: digital education, digital learning, high school students, TAM, education technology

1. Introduction

The advent and rapid evolution of digital technologies have irreversibly transformed the landscape of education globally (Jiang et al., 2022). In the context of China, a country marked by its vast population and significant regional disparities, the integration of online teaching and learning platforms in high school education presents both unprecedented opportunities and formidable challenges (Jiang & Pu, 2021). This paper seeks to unravel the intricate dynamics of online teaching and learning among Chinese high school students, with a particular focus on the pursuit of educational equality.

Educational equality, a cornerstone of sustainable development in education, has garnered considerable attention worldwide (Jiang et al., 2022). In China, with over 50 million high school students and nearly 15,000 high schools, the pursuit of educational equality is particularly complex. This complexity is heightened in the digital era, where the digital divide – stemming from regional economic disparities, differences in educational levels, and variances in educational resources – poses significant challenges (Ying & Wright, 2023). The recent policy and technological advancements in China have notably aimed at bridging this divide. However, the actual impact of these policies on narrowing the educational gap, particularly for high school education, remains a subject of ongoing debate and inquiry.

The rapid expansion of China's online education market, estimated at 443 billion yuan in 2022, underscores the sector's potential for addressing educational inequalities (Hannum, 2023). This burgeoning market has been further

propelled by the COVID-19 pandemic, which necessitated a pivot to distance learning (Pu & Jiang, 2021). Yet, the technological advancements that enable online education also to bring forth challenges such as data security, network stability, and platform reliability (Pu et al., 2022). These challenges are particularly pronounced in less developed regions, where access to stable internet and advanced technology is limited.

In China, educational inequality manifests starkly across geographical regions and socio-economic classes (Wang et al., 2023). This disparity is particularly acute in provinces like Sichuan, where geographical and economic challenges exacerbate educational inequalities(Tlili et al., 2019). The integration of online education is seen as a potential solution to these inequalities. However, the effectiveness of online education as a tool for promoting educational equity, especially in regions with pronounced disparities like Sichuan, remains largely unexplored.

In response to these disparities, several inter-school online education initiatives have emerged. These initiatives focus on resource sharing, teacher training programs, and collaborative learning, aiming to create a more equitable educational landscape. While these are promising steps, empirical data assessing their effectiveness in promoting educational equity is scant.

Academic inquiry into the acceptance and impact of online education platforms among high school students has been growing. Studies have indicated that factors such as perceived usefulness, ease of use, trust, and social influence significantly impact user acceptance (Yu et al., 2023). However, there is a noticeable gap in research specifically focused on high school education in provinces like Sichuan. This gap is particularly relevant when considering the unique socio-economic and technological challenges faced by students in these regions.

This study aims to address the critical question of whether and how online education can serve as a mechanism to promote educational equity in China, particularly in the high school sector. It seeks to explore the factors influencing the acceptance and effectiveness of online teaching and learning among high school students in Sichuan Province, a region emblematic of China's educational disparities.

In sum, this paper aims to contribute to the discourse on educational equality in China by examining the role of online education in high schools, particularly in regions grappling with significant educational disparities. The study's findings are expected to offer valuable insights for educators, policymakers, and stakeholders committed to fostering a more equitable educational landscape in the digital age.

2. Literature Review

2.1 Theoretical Approach

The understanding of the factors affecting the acceptance and use of online education platforms in China is best conceptualized through the integration of three key theoretical frameworks: the Theory of Planned Behavior (TPB), Learning Motivation Theory, and the Technology Acceptance Model (TAM).

TPB provides a fundamental understanding of the decision-making process involved in adopting online education platforms. It emphasizes three main determinants: attitude, subjective norm, and perceived behavioral control. Attitude encapsulates the individual’s belief about the outcomes of using online education platforms and their desirability. Subjective norm refers to the perceived social pressures or influences from significant others, such as family, friends, or peers. Perceived behavioral control is the individual's assessment of their ability to use the platform effectively. In the context of Chinese high school students, these factors collectively inform their intentions and usage of online educational tools, reflecting how personal, social, and control factors intertwine to influence behavior.

Learning Motivation Theory delves into the role of intrinsic and extrinsic motivational factors in driving the acceptance and engagement with online education platforms. Intrinsic motivation, stemming from an inherent interest or enjoyment in learning activities, can lead to a deeper and more meaningful engagement with online learning. Conversely, extrinsic motivation, driven by external rewards or outcomes like grades or career advancement, may prompt students to utilize online platforms that align with these goals. Furthermore, self-efficacy and goal orientation are crucial in this framework; they dictate how confident students feel in their abilities to use the platforms and how their learning goals align with the platform's offerings. In China, where educational achievement is highly valued, these motivational factors play a significant role in shaping students' attitudes towards online learning.

TAM, widely recognized for its application in technology adoption, further complements the understanding of online platform usage. It posits that two primary factors, perceived usefulness, and perceived ease of use, are central to the

acceptance and usage of new technologies. Perceived usefulness refers to the degree to which a user believes that the technology enhanced their performance, while perceived ease of use relates to the user's belief that the technology is effortless to use. In the realm of online education, if students perceive these platforms as beneficial for their learning and easy to navigate, their likelihood of adoption and consistent use increases. This model has been validated in diverse cultural contexts, including China, highlighting its universal applicability.

In combining these theories, a comprehensive picture emerges, illustrating the multifaceted nature of online education platform adoption among high school students in China. TPB underscores the influence of personal attitudes, social norms, and perceived control; Learning Motivation Theory highlights the critical role of intrinsic and extrinsic motivations, self-efficacy, and goal orientation, while TAM focuses on the perceived usefulness and ease of use of the platforms. Together, these theories provide a rich tapestry of insights into the factors driving the acceptance and effective use of online education platforms, offering valuable guidance for educators, policymakers, and platform developers in creating more engaging, accessible, and effective digital learning environments.

2.2 Hypothesis Development

Extensive research, including Fiock (2020) and Gopal et al. (2021), has highlighted the direct impact of high-quality online teaching on the perceived usefulness of online learning. These studies pinpoint that element like comprehensive course content, prompt feedback, and active instructor engagement are integral to enhancing students' perceptions of the utility and effectiveness of online learning. This is primarily because such quality elements contribute to greater student satisfaction and learning outcomes. Thus, it leads to the hypothesis:

H1: High-quality online teaching positively affects the perceived usefulness of online learning.

Panergayo (2021) has demonstrated quality in online teaching, particularly aspects like user-friendly interfaces and clear instructions, plays a crucial role in influencing students' perceptions regarding the ease of use of online platforms. These elements reduce cognitive load and enhance user experience, making the learning process more approachable and less daunting for students. Consequently, the hypothesis is formulated as:

H2: High-quality online teaching positively affects the perceived ease of use of online learning.

Research by Dung (2020) suggests that the quality of online teaching significantly affects subjective norms and attitudes towards online learning. High-quality online teaching fosters a more positive perception among students and the larger community, enhancing societal approval and individual attitudes towards online learning modalities. These studies provide a basis for the following hypotheses:

H3: High-quality online teaching positively affects the subjective norm related to online learning.

H4: High-quality online teaching positively affects attitudes towards online learning.

Studies by Saxena et al. (2021) and Ayu (2020) emphasize the critical impact of online course quality on perceived usefulness and ease of use. Well-structured courses with timely feedback and interactive teaching methods contribute significantly to students' learning outcomes, thereby enhancing the perceived utility and approachability of online learning platforms. Fitzpatrick & Kuo (2022) further support this by highlighting how simplicity and clarity in course design improve the user's perception of ease of use. This leads to:

H5: High-quality online courses positively affect the perceived usefulness of online learning.

H6: High-quality online courses positively affect the perceived ease of use of online learning.

Pal & Vanijja (2020) and Baber (2020), indicates that course quality significantly influences students' subjective norms and attitudes towards online education. Quality elements like course comprehensiveness, relevance, and user-friendliness not only enhance students' perceptions but also shape societal norms regarding online education. These findings underpin the hypotheses:

H7: High-quality online courses positively affect the subjective norm related to online learning.

H8: High-quality online courses positively affect attitudes towards online learning.

In line with the Technology Acceptance Model, research by Ayu (2020) and Unal & Uzun (2021) underscores that perceived usefulness and ease of use are key determinants of learners' intentions towards online learning. The simplicity and perceived benefits of online platforms are shown to directly influence learners' willingness to adopt e-learning. Additionally, the interrelation between perceived ease of use and usefulness suggests a compound effect on online learning intentions. Hence, the study proposes:

H9: Perceived usefulness of online learning positively affects online learning intention.

H10: Perceived ease of use of online learning positively affects online learning intention.

Ang et al. (2022) and Rawashdeh et al. (2021) align with the Theory of Planned Behavior (TPB), suggesting that subjective norms significantly influence online learning intentions. This is based on the premise that perceived social pressures and the influence of peers and society at large play a critical role in an individual's decision to engage in online learning. Kaushik & Lipton (2018) empirically demonstrated this relationship, thereby supporting the hypothesis:

H11: Subjective norm positively affects online learning intention.

Rajeh et al. (2021) confirm the significant influence of attitudes towards online learning on learners' intentions to engage in it. A positive attitude, indicative of a favorable appraisal of online education, correlates strongly with the likelihood of engaging with online learning platforms. Hence, the hypothesis is:

H12: Attitude towards online learning positively affects online learning intention.

The concept of perceived usefulness, derived from Davis's Technology Acceptance Model (TAM), is widely applied in the context of online learning (Yilmaz, 2017). Studies, including Patricia Aguilera-Hermida (2020) and Granić & Marangunić (2019), have consistently shown a significant positive relationship between perceived usefulness and acceptance behavior in online learning contexts. Therefore, it leads to:

H13: Perceived usefulness of online learning positively affects online learning behavior.

Li et al. (2022) and Megat Abdul Rahim et al. (2021) found that students' attitudes towards online learning are a significant predictor of their acceptance behavior. Conrad et al. (2022) further support this, indicating that positive attitudes towards online learning are instrumental in shaping learners' behavioral intentions to use such systems. Thus, the hypothesis is developed as:

H14: Attitude towards online learning positively affects online learning behavior.

Gunasinghe et al. (2019) have illustrated the strong correlation between online learning intentions and subsequent online learning behaviors. These studies demonstrate that when students exhibit a strong intention to learn online, it significantly impacts their actual engagement and usage of online learning systems. Hence, the hypothesis is formulated as:

H15: Online learning intention positively affects online learning behavior.

Research by Shamir-Inbal & Blau (2021) and Fatani (2020) indicates that perceived usefulness and ease of use mediate the relationship between online teaching quality and online learning intention. High-quality online teaching enhances perceptions of usefulness and ease, thus influencing students' intentions to use online learning platforms. Therefore, the hypotheses are:

H16: Perceived usefulness of online learning mediates the relationship between online teaching quality and online learning intention.

H17: Perceived ease of use of online learning mediates the relationship between online teaching quality and online learning intention.

The role of subjective norms and attitudes as mediators in the relationship between online teaching quality and online learning intention is highlighted in studies by Abdullah & Toycan (2017). High-quality online teaching is seen to positively influence both the subjective norms and attitudes of learners, which in turn affects their intention to engage in online learning. This leads to:

H18: Subjective norm mediates the relationship between online teaching quality and online learning intention.

H19: Attitude towards online learning mediates the relationship between online teaching quality and online learning intention.

Research by Rahayu & Wirza (2020) and Hilliger et al. (2020) suggests that perceived usefulness mediates the impact of online course quality on online learning intention. Additionally, Gunasinghe et al. (2019) demonstrate the mediating role of perceived ease of use in this relationship. Quality online courses, by enhancing perceived usefulness and ease of use, significantly influence learners' intentions to engage with online learning platforms. Therefore, the hypotheses are developed as:

H20: Perceived usefulness of online learning mediates the relationship between online course quality and online learning intention.

H21: Perceived ease of use of online learning mediates the relationship between online course quality and

online learning intention.

Almaiah et al. (2020) suggest that subjective norm, or perceived social pressure, plays a mediating role between the quality of online courses and learning intention. High-quality online courses can shape positive subjective norms, thereby influencing learners' intentions to engage in online courses. This leads to the hypothesis:

H22: Subjective norm mediates the relationship between online course quality and online learning intention.

Rajeh et al. (2021) argue that students' attitudes towards online learning can mediate the relationship between online course quality and their learning intentions. High-quality courses might foster positive attitudes, which in turn enhances the intention to engage in online learning. Thus:

H23: Attitude towards online learning mediates the relationship between online course quality and online learning intention.

Pal & Vanijja (2020) and El-Masri & Tarhini (2017) in the UTAUT model emphasize that perceived usefulness and ease of use are key determinants of online learning behavior, with online learning intention mediating these relationships. Thus, two hypotheses are proposed:

H24: Online learning intention mediates the relationship between perceived usefulness of online learning and online learning behavior.

H25: Online learning intention mediates the relationship between perceived ease of use of online learning and online learning behavior.

Rajeh et al. (2021) suggest that online learning intention mediates relationships involving subjective norms and attitudes towards online learning. High-quality online courses influence these subjective norms and attitudes, which are then channeled through online learning intentions to impact online learning behavior. Hence, the hypotheses:

H26: Online learning intention mediates the relationship between subjective norm and online learning behavior.

H27: Online learning intention mediates the relationship between attitude towards online learning and online learning behavior.

Applying TAM and UTAUT to the context of e-learning, Lanlan et al. (2019) and Ang, Chew, et al. (2022) posit that perceived usefulness and ease of use, influenced by online teaching quality, can drive online learning intentions, impacting acceptance behavior. Therefore:

H28: Perceived usefulness of online learning and online learning intention have chain mediation in the relationship between online teaching quality and online learning behavior.

H29: Perceived ease of use of online learning and online learning intention have chain mediation in the relationship between online teaching quality and online learning behavior.

In line with the Theory of Planned Behavior, Ang et al. (2021) and Yu et al. (2021) suggest that subjective norms and attitudes towards online learning, influenced by online teaching quality, can mediate the relationship between teaching quality and online learning behavior. This results in two hypotheses:

H30: Subjective norm and online learning intention have chain mediation in the relationship between online teaching quality and online learning behavior.

H31: Attitude towards online learning and online learning intention have chain mediation in the relationship between online teaching quality and online learning behavior.

The relationship between online course quality and online learning behavior, as proposed by Olivia & Marchyta (2022), is mediated by perceived usefulness and ease of use, along with learning intention. Therefore:

H32: Perceived usefulness of online learning and online learning intention have chain mediation in the relationship between online course quality and online learning behavior.

H33: Perceived ease of use of online learning and online learning intention have chain mediation in the relationship between online course quality and online learning behavior.

Building on the works of Peimani & Kamalipour (2021) and Patricia Aguilera-Hermida (2020b), it is proposed that subjective norms and attitudes towards online learning, influenced by online course quality, mediate the relationship with online learning behavior. These hypotheses are:

H34: Subjective norm and online learning intention have chain mediation in the relationship between online

course quality and online learning behavior.

H35: Attitude towards online learning and online learning intention have chain mediation in the relationship between online course quality and online learning behavior.

3. Research Method

The study employs a quantitative research design, focusing on high school students' acceptance of online learning behaviors in the Sichuan province, specifically in the regions of Dazhou, Bazhong, and Liangshan. These regions are chosen due to their comparatively lower quality of high school education. The data collection is conducted through online questionnaires, disseminated by homeroom teachers who act as gatekeepers, ensuring targeted and efficient participant recruitment. The sample size of 633 students is determined using purposive sampling, which aims to validate the sample's relevance to the research objectives. This method is particularly effective in ensuring that the participants have direct experience with online learning resources provided by high-quality high schools in Sichuan Province, thus offering valuable insights into the factors influencing online learning behavior.

The research utilizes a series of structured online questionnaires, each designed to accurately measure key variables on a 5-point Likert scale:

Online Teaching Quality: Measured by questions adapted from Arbaugh (2000); Sun et al. (2008); Swan (2001); Richardson & Swan (2003) and Moore (1989), this variable assesses clarity in communication of course topics, ease of navigation on the online platform, timeliness and constructiveness of instructor feedback, the clarity and helpfulness of course materials, and the degree of interactive student discussions.

Online Course Quality: Following the frameworks set by Arbaugh & Rau (2007); Picciano (2002); Swan et al. (2012); Sun et al. (2008) and Picciano (2002), this construct evaluates the clarity and relevance of learning objectives, the quality and relevance of course materials, the extent of student engagement and active learning, the quality of feedback for improvement, the effectiveness of technological tools, and the diversity and inclusivity of course content.

Perceived Usefulness and Ease of Use of Online Learning: These variables are assessed based on students' perceptions of the support provided by the online learning environment for their understanding and mastery of course material, and the degree of ease associated with using the online learning platforms. These aspects are measured through questions based on the works of Wu & Chen (2017) and Tarhini et al. (2017).

Subjective Norm and Attitude Towards Online Learning: This segment evaluates students' perceptions of the opinions of influential people (such as family, friends, teachers) regarding their use of online learning platforms, as well as their personal attitudes towards online learning. The measurement is guided by sources like Bervell & Umar (2017); Al-Emran et al. (2018); Escobar-Rodriguez & Monge-Lozano (2012); Nortvig et al. (2018); and Khechine et al. (2016).

Intention and online Learning behavior: The students' future for using online learning platforms, their regular usage patterns, their likelihood of recommending these platforms to peers, and the integration of online learning into their study routines are evaluated. These questions are formulated based on the research of Almaiah & Alismaiel (2019) Almaiah and Alismaiel (2019); Šumak and Šorgo (2016); Bervell & Umar (2017); Alqurashi (2019) and Oliveira et al. (2017).

The data analysis for this research on high school students' online learning behavior encompasses a series of methodologically rigorous steps, each crucial for interpreting and understanding the gathered data. Initially, descriptive statistical analysis is conducted, which involves computing measures of central tendency and dispersion. This step is essential in summarizing the data, providing a comprehensive overview of the central trends and the degree of variability within the dataset. Following this, reliability and validity analysis is carried out to ensure the accuracy and consistency of the measures. Reliability is assessed using methods like internal consistency, exemplified by Cronbach's alpha, while validity is evaluated through rigorous content, criterion, and construct validity assessments. Subsequently, the study employs Confirmatory Factor Analysis (CFA) using AMOS 27.0. CFA is crucial in verifying the factor structure of the observed variables, thereby testing the hypothesized relationships between these variables and their underlying latent constructs. This step ensures that the measured variables accurately represent the theoretical constructs they are intended to. Building on this, Structural Equation Modeling (SEM) is utilized, integrating factor analysis and multiple regression analysis to examine both direct and indirect effects within the proposed model. SEM is particularly beneficial in this context as it allows for the testing of complex relationships between multiple variables, both observed and latent. Furthermore, path analysis is used to

evaluate causal models, scrutinizing the relationships between a dependent variable and multiple independent variables. This analysis is instrumental in identifying direct, indirect, and spurious effects within the model. Complementing path analysis, mediation analysis, especially with bootstrapping techniques in AMOS, is applied to delve into the indirect effects and to unravel the underlying mechanisms that interlink the variables. This is particularly pertinent for understanding how different factors such as subjective norms, attitudes, and perceived usefulness influence students' online learning behavior.

4. Results

4.1 Descriptive Analysis

Table 1 provides a detailed breakdown of the demographic distribution of participants in the study.

The sample comprises a larger proportion of female participants (57.7%) compared to males (42.3%). This disparity suggests that female students might have had a greater inclination or opportunity to partake in the survey, or it could reflect the gender distribution of the target population.

The grade level distribution reveals that most respondents are from Senior Two, accounting for 46.4% of the total. This is followed by Senior One students at 36.3%, and finally, Senior Three students constitute 17.2%. The underrepresentation of Senior Three students might be indicative of their potentially busier academic schedules or decreased engagement with online platforms in their final year.

In terms of annual family income, the largest segments of the respondents fall into the <100,000 yuan and 200,000yuan-300,000yuan brackets, both accounting for 31.3%. Those with incomes ranging between 100,000yuan and 200,000yuan represent 27.3% of the sample, while the smallest group, with incomes exceeding 300,000yaun, constitutes 10.1%. This distribution offers insights into the socio-economic backgrounds of the participants, which could be pivotal when examining factors related to online education accessibility and quality from an equality perspective.

The city distribution is relatively balanced, with Dazhou having a slight lead at 36.5%. Bazhong follows closely with 35.9%, and Liangshan represents 27.6% of the participants. This almost uniform distribution across cities suggests that the study has managed to capture a diverse set of experiences and perspectives related to online teaching and learning.

A significant majority of the respondents, 66.2%, hail from urban areas, with the remaining 33.8% from rural areas. Given the potential disparities in infrastructure, resources, and exposure to online education between urban and rural settings, this distribution underscores the importance of analyzing data with an eye on urban-rural differences.

Table 1. Essential Information

		Frequency	Percent
Gender	Male	268	42.3
	Female	365	57.7
Grade	Senior One	230	36.3
	Senior Two	294	46.4
	Senior Three	109	17.2
Family income/ year	＜100000￥	198	31.3
	100000￥-200000￥	173	27.3
	200000￥-300000￥	198	31.3
	>300000￥	64	10.1
City	Dazhou	231	36.5
	Bazhong	227	35.9
	Liangshan	175	27.6
Area	Urban area	419	66.2
	Rural area	214	33.8

In conclusion, the demographic data presented in Table 1 offers a comprehensive overview of the participants in the

study. Recognizing these demographic nuances are essential in understanding the diverse experiences and challenges faced by Chinese high school students in the realm of online education, especially when viewed from an education equality lens.

4.2 Reliability and Validity Analysis

As detailed in Table 2, the instrument achieved a Cronbach's Alpha value of .954, indicating a very high level of internal consistency among the 43 items. This value significantly exceeds the acceptable threshold of .7 in social science research, situating it in the realm of 'excellent' reliability. Such a high alpha, especially with a substantial number of items, underscores the robustness and reliability of the questionnaire. It implies that the items consistently measure the same underlying constructs, ensuring the dependability of the data collected.

The validity of the data for factor analysis in this research is ascertained using the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity, presented in Table 3. The KMO value obtained is .960, indicating an excellent level of sampling adequacy for factor analysis. This high KMO value suggests that the sample is highly suitable for factor analysis, with substantial common variance among variables, thereby justifying the application of this statistical method.

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
.954	43

Table 3. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.960
Bartlett's Test of Sphericity	Approx. Chi-Square	13726.679
	df	903
	Sig.	.000

4.3 Confirmatory Factor Analysis

Table 4 validates the convergent validity of various latent variables related to online learning. It shows substantial factor loadings for each latent variable, ranging from above 0.7 to approximately 0.8, indicating strong correlations between observation indicators and their corresponding latent variables. The Composite Reliability (CR) values, ranging between 0.83 and 0.90, exceed the 0.7 threshold, confirming the internal consistency and reliability of the constructs. Furthermore, the Average Variance Extracted (AVE) values between 0.5 and 0.6 suggest that more than half of the variance in the observation indicators is accounted for by the latent variables. These metrics collectively demonstrate the robustness and validity of the measurement model in the study.

Table 4. Convergence Validity

Latent variables	Observation indicators	Factor loading	CR	AVE
Online teaching quality	OT1	0.763	0.871	0.575
	OT2	0.741		
	OT3	0.793		
	OT4	0.726		
	OT5	0.767		
Online course quality	Oc1	0.818	0.902	0.606
	Oc2	0.766		
	Oc3	0.799		
	Oc4	0.775		
	Oc5	0.744		
	Oc6	0.766		
Perceived usefulness of online learning	Pu1	0.746	0.830	0.551
	Pu2	0.784		

Perceived ease of use of online learning	Pu3	0.730	0.831	0.552
	Pu4	0.705		
	Pe1	0.769		
	Pe2	0.707		
	Pe3	0.755		
	Pe4	0.739		
Subjective norm	Sn1	0.780	0.872	0.577
	Sn2	0.746		
	Sn3	0.784		
	Sn4	0.745		
	Sn5	0.742		
Attitude towards online learning	At1	0.736	0.827	0.544
	At2	0.735		
	At3	0.739		
	At4	0.741		
Intention to Online learning	It1	0.736	0.873	0.579
	It2	0.766		
	It3	0.769		
	It4	0.746		
	It5	0.787		
Online learning behavior	Ao1	0.755	0.870	0.573
	Ao2	0.711		
	Ao3	0.831		
	Ao4	0.761		
	Ao5	0.720		

Note: OT: Online teaching quality; Oc: Online course quality; Pu: Perceived usefulness of online learning; Pe: Perceived ease of use of online learning; Sn: Subjective norm; At: Attitude towards online learning; It: Intention to Online learning; Ao: Online learning behavior

Table 5 in the study showcases the discriminant validity of various latent variables related to online learning. The diagonal elements, representing the square root of the Average Variance Extracted (AVE) for each construct, are consistently greater than the off-diagonal elements, which indicate correlations between constructs. For example, the value of 0.758 for 'Online Teaching Quality' exceeds its correlations with other constructs. This pattern across the table confirms that each construct shares more variance with its own indicators than with other constructs, affirming discriminant validity. Such results are crucial in ensuring that each construct is unique and measures distinct aspects of online learning, reinforcing the integrity and validity of the research findings.

Table 5. Distinguish between Validity Tests

Latent variables	1	2	3	4	5	6	7	8
Online teaching quality	0.758							
Online course quality	0.637	0.778						
Perceived usefulness of online learning	0.653	0.605	0.742					
Perceived ease of use of online learning	0.691	0.645	0.568	0.743				
Subjective norm	0.636	0.611	0.706	0.606	0.760			
Attitude towards online learning	0.642	0.613	0.572	0.618	0.618	0.738		
Intention to Online learning	0.610	0.582	0.658	0.633	0.693	0.615	0.761	
Online learning behavior	0.630	0.640	0.583	0.600	0.648	0.632	0.673	0.757

Table 6 provides a comprehensive evaluation of the model's fit through confirmatory factor analysis using various indices. The $\chi 2/df$ ratio of 1.417 suggests a good fit, being well below the preferred threshold of 3. The RMSEA value at 0.026 indicates an excellent fit, far surpassing the standard of less than 0.08. The GFI stands at 0.932, and the AGFI at 0.921, both exceeding their respective desirable levels (0.9 and 0.85), reinforcing the model's adequacy. Furthermore, the NFI, TLI, and CFI values, all above 0.9 (0.935, 0.978, and 0.980 respectively), confirm an excellent fit of the model. Collectively, these metrics affirm the robustness and appropriateness of the model in the context of the study.

Table 6. Confirmatory Factor Model Fit Metrics

Fit index	$\chi 2/df$	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	>0.85	>0.9	>0.9	>0.9
Result	1.417	0.026	0.932	0.921	0.935	0.978	0.980

4.4 Structural equation model

Table 7 in the study outlines the fit metrics for the structural equation model (SEM), providing a clear picture of the model's adequacy. The $\chi 2/df$ ratio of 1.607 falls within the preferred range of less than 3, suggesting a good model fit. The RMSEA value at 0.031 indicates an excellent fit, well within the desired standard of below 0.08. The GFI value of 0.921 and AGFI value of 0.910, both exceeding their respective benchmarks (0.9 and 0.85), confirm the model's satisfactory fit. Additionally, the NFI, TLI, and CFI indices, with values of 0.925, 0.968, and 0.970 respectively, surpass the threshold of 0.9, further validating the model's excellent fit with the observed data. These metrics collectively affirm the robustness and appropriateness of the SEM in the context of the study.

Table 7. Model Fit Metrics

Fit index	$\chi 2/df$	RMSEA	GFI	AGFI	NFI	TLI	CFI
Reference standards	<3	<0.08	>0.9	>0.85	>0.9	>0.9	>0.9
Result	1.607	0.031	0.921	0.910	0.925	0.968	0.970

Table 8. Structural Equation Model Path Test

Hypothesis	Path	Estimate	β	S.E.	C.R.	P	Results
H1	OT→Pu	0.472	0.486	0.054	8.806	***	Supported
H2	OT→Pe	0.527	0.495	0.057	9.213	***	Supported
H3	OT→Sn	0.469	0.463	0.053	8.798	***	Supported
H4	OT→At	0.450	0.459	0.054	8.356	***	Supported
H5	Oc→Pu	0.285	0.318	0.046	6.196	***	Supported
H6	Oc→Pe	0.334	0.340	0.049	6.789	***	Supported
H7	Oc→Sn	0.314	0.336	0.046	6.771	***	Supported
H8	Oc→At	0.316	0.348	0.047	6.714	***	Supported
H9	Pu→It	0.221	0.226	0.048	4.610	***	Supported
H10	Pe→It	0.204	0.229	0.045	4.548	***	Supported
H11	Sn→It	0.316	0.337	0.045	6.943	***	Supported
H12	At→It	0.149	0.154	0.047	3.182	0.001	Supported
H13	Pu→Ao	0.167	0.171	0.049	3.401	***	Supported
H14	At→Ao	0.320	0.330	0.049	6.508	***	Supported
H15	It→Ao	0.380	0.379	0.054	6.990	***	Supported

Table 8 presents the testing results for various hypotheses within the structural equation model, highlighting the key relationships in online teaching and learning. H1, linking "Online Teaching Quality (OT)" with "Perceived Usefulness of Online Learning (Pu)," is supported by a significant coefficient of 0.472, indicating that better online teaching quality enhances perceived usefulness. H2, proposing a positive influence of "OT" on "Perceived Ease of Use of Online Learning (Pe)," is also supported with a significant coefficient of 0.495.

Similarly, H3 and H4, exploring the impact of "OT" on "Subjective Norm (Sn)" and "Attitude towards Online Learning (At)" respectively, are validated with significant results, affirming the influence of online teaching quality on subjective norms and attitudes. H5 to H8 focus on "Online Course Quality (Oc)" and its significant impact on "Pu," "Pe," "Sn," and "At," underscoring the pivotal role of course quality.

The H9 to H11 link "Pu," "Pe," and "Sn" with "Intention to Online Learning (It)," confirming the direct effects of perceived benefits, ease of use, and social norms on learning intentions. Lastly, H12 to H15 demonstrate significant paths from "Pu," "At," and "It" to "Online Learning Behavior (Ao)," highlighting how perceptions, attitudes, and intentions converge to influence actual learning behavior.

Overall, Table 8 illustrates a robust structural model where both "Online Teaching Quality" and "Online Course Quality" significantly shape various aspects of students' online learning experiences, from perceptions and attitudes to intentions and behaviors.

Table 9 provides a detailed analysis of mediation effects within the structural equation model, exploring the intricate relationships among various constructs in online learning. H16, examining the mediation effect of "Perceived Usefulness of Online Learning (Pu)" in the link between "Online Teaching Quality (OT)" and "Intention to Online Learning (It)," is supported by a significant effect size and a confidence interval not including zero.

H17 to H19, investigating the mediation roles of "Perceived Ease of Use of Online Learning (Pe)," "Subjective Norm (Sn)," and "Attitude towards Online Learning (At)" in the pathway from "OT" to "It," all demonstrate significant mediation effects. Similarly, H20 to H23 affirm the mediating roles of "Pu," "Pe," "Sn," and "At" in the relationship between "Online Course Quality (Oc)" and "It," highlighting how perceptions and attitudes mediate the impact of course quality on learning intentions.

H24 to H27 focus on the mediating effect of "It" in transforming perceptions and attitudes, specifically "Pu," "Pe," "Sn," and "At," into actual "Online Learning Behavior (Ao)." The results validate the significant role of learning intentions in this process.

Table 9. Mediation Effect Bootstrap Test

Hypothesis	Mediation path	Effect size	SE	Bias-Corrected		Results
				95%CI		
H16	OT→Pu→It	0.104	0.044	0.034	0.212	Supported
H17	OT→Pe→It	0.107	0.040	0.036	0.193	Supported
H18	OT→Sn→It	0.148	0.044	0.067	0.243	Supported
H19	OT→At→It	0.067	0.035	0.009	0.146	Supported
H20	Oc→Pu→It	0.063	0.029	0.021	0.139	Supported
H21	Oc→Pe→It	0.068	0.029	0.023	0.144	Supported
H22	Oc→Sn→It	0.099	0.034	0.046	0.184	Supported
H23	Oc→At→It	0.047	0.023	0.009	0.100	Supported
H24	Pu→It→Ao	0.084	0.037	0.027	0.189	Supported
H25	Pe→It→Ao	0.077	0.035	0.021	0.159	Supported
H26	Sn→It→Ao	0.120	0.043	0.046	0.215	Supported
H27	At→It→Ao	0.057	0.028	0.013	0.125	Supported
H28	OT→Pu→It→Ao	0.040	0.020	0.013	0.105	Supported
H29	OT→Pe→It→Ao	0.041	0.019	0.012	0.086	Supported
H30	OT→Sn→It→Ao	0.056	0.024	0.021	0.111	Supported
H31	OT→At→It→Ao	0.026	0.014	0.006	0.065	Supported
H32	Oc→Pu→It→Ao	0.024	0.012	0.008	0.060	Supported
H33	Oc→Pe→It→Ao	0.026	0.013	0.007	0.063	Supported
H34	Oc→Sn→It→Ao	0.038	0.016	0.014	0.084	Supported
H35	Oc→At→It→Ao	0.018	0.009	0.005	0.043	Supported

Finally, H28 to H35 delve into chained mediation effects involving multiple mediators, revealing the complex interactions between "OT," "Oc," perceptions, attitudes, intentions, and "Ao."

Table 9 underscore the multifaceted nature of online learning, where direct influences of teaching and course quality are intricately linked with perceptions, attitudes, and intentions, ultimately shaping online learning behaviors. This nuanced understanding highlights the cascading effects of these variables in the realm of online education.

Figure 1 portrays the structural equation model for encouraging the high school students to study online based on the hypothesis verifying results.

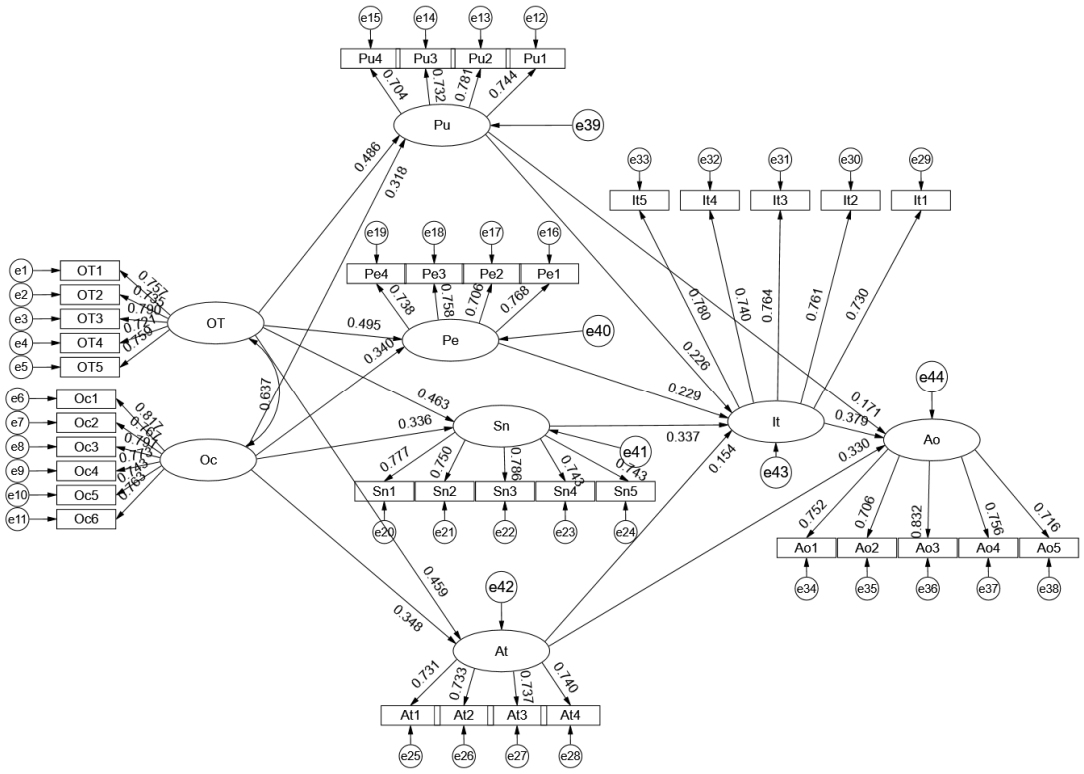

Figure 1. Structural Equation Model for Encouraging the High School Students to Study Online

5. Discussion

5.1 Theoretical Implications

This study offers substantial theoretical contributions to the field of online education. By employing a comprehensive structural equation model, the research provides nuanced insights into how various factors interplay in shaping online learning experiences.

The findings align with and extend previous research by highlighting the multifaceted impact of online teaching and course quality (Fu et al., 2023). While prior studies have independently explored aspects like teaching quality or course design (Jiang et al., 2022; Wang et al., 2023), this research integrates these dimensions, providing a more holistic understanding. The results concerning the mediation effects of perceptions and attitudes also build upon existing literature, emphasizing the complex pathways through which teaching and course quality impact learning behavior.

The study makes several key theoretical contributions. Firstly, it offers an integrated framework that combines multiple factors affecting online learning, a significant advancement over studies that have focused on isolated aspects (Ming et al., 2023; Zhai et al., 2023). Secondly, the research underscores the role of subjective norms and attitudes in mediating the relationship between teaching/course quality and online learning behavior, an area less explored in prior studies (Ming et al., 2023). Lastly, the application of a comprehensive structural equation model in the context of Chinese high school students' online learning is a notable methodological innovation, contributing to

the broader understanding of educational equity in the digital age.

In conclusion, the study significantly enriches the theoretical landscape of online education research. It not only corroborates existing theories but also introduces new perspectives on the interdependencies among various factors influencing online learning. These insights are particularly relevant in the context of educational equality, offering valuable directions for future research in diverse educational settings.

5.2 Practical Implications

The research highlights the critical role of online teaching and course quality in influencing students' learning experiences. Educators should focus on enhancing the clarity of communication, incorporating interactive teaching methods, and providing timely, constructive feedback. Academic institutions, on their part, should invest in developing high-quality, inclusive online course materials that cater to diverse student backgrounds and learning styles. Training programs for educators to develop online teaching skills and digital literacy are also vital. Additionally, institutions should regularly evaluate and update their online course offerings to maintain engagement and relevance.

The findings underscore the need for robust policy support in developing and maintaining digital infrastructure, particularly in underdeveloped regions. Policymakers should prioritize equal access to online education resources, ensuring that all students, regardless of their geographical location or socio-economic status, can benefit from digital learning. This includes formulating and enforcing standards for online education to maintain high educational quality across institutions. Policies encouraging partnerships between well-resourced and less-resourced schools could facilitate resource sharing and promote educational equity.

Technology developers have a crucial role in shaping the online learning landscape. The study's emphasis on the perceived ease of use of online platforms suggests a need for user-friendly, intuitive learning environments. Developers should focus on creating platforms that are accessible to students with varying levels of technological proficiency. Incorporating innovative tools such as interactive multimedia, augmented reality, and gamification can enhance engagement and learning outcomes. Continuous collaboration with educators and students for feedback can lead to more effective and tailored online learning solutions.

Parents and community members play a supportive role in promoting online learning. Encouraging student engagement with digital platforms and advocating for resources in underprivileged areas can help bridge the digital divide. Students, in turn, should be encouraged to adopt a positive attitude towards online learning and actively participate in courses. This includes engaging in discussions, collaborative activities, and utilizing available resources for a comprehensive learning experience. Developing self-motivation and time management skills can also greatly enhance their online learning effectiveness.

In conclusion, these practical implications point towards a collaborative effort among educators, policymakers, technology developers, parents, and students. By addressing these recommendations, stakeholders can significantly improve the quality and effectiveness of online education, contributing to the overarching goal of educational equity.

6. Conclusion

The study offers critical insights into the multifaceted dimensions influencing online learning in a high school context. It highlights the pivotal roles played by the quality of online teaching and course materials, perceived usefulness and ease of use, subjective norms, attitudes towards online learning, and students' intentions and actual behaviors towards online education.

A key takeaway is the profound impact of online teaching quality and course content on students' perceptions and engagement with online learning platforms. The study underscores the necessity for educators and academic institutions to prioritize and enhance these aspects to improve student learning experiences and outcomes. Additionally, the research emphasizes the importance of understanding and addressing students' perceptions, attitudes, and intentions in online learning scenarios, as these significantly influence their learning behaviors.

The findings also offer valuable implications for policymakers, technology developers, and the educational community, suggesting a collaborative approach towards creating more effective and equitable online learning environments. The recommendations provided are aimed at various stakeholders, including educators, policymakers, technology developers, parents, and students, to collectively work towards improving the quality and accessibility of online education.

The study primarily focuses on high school students from specific regions in Sichuan Province, China. This

geographical concentration might limit the generalizability of the findings to other regions or educational contexts. The reliance on self-reported data through questionnaires can introduce biases such as social desirability or response biases, potentially affecting the authenticity of the responses. The study may not fully account for the variance in technological access and proficiency among students, which can significantly influence their online learning experience.

Future studies should consider a more diverse sample, including students from different regions and countries, to enhance the generalizability of the findings. Implementing longitudinal research designs could provide deeper insights into how students' perceptions and behaviors towards online learning evolve over time. Incorporating qualitative methods such as interviews or focus groups could offer a richer, more nuanced understanding of students' experiences and attitudes towards online learning. Further research could explore how differences in technological access and digital literacy impact students' engagement and success in online learning environments. Implementing experimental or quasi-experimental designs could help establish causal relationships between online teaching methodologies and student outcomes. By addressing these limitations and considering these suggestions for future research, scholars can build upon the findings of this study to develop a more comprehensive understanding of the factors influencing online teaching and learning. This ongoing research is crucial in informing educational strategies and policies aimed at maximizing the potential of online learning platforms.

In conclusion, this research contributes significantly to the understanding of online education dynamics in a high school context, particularly in regions striving for educational equality. The insights gained are instrumental in guiding future educational strategies and policies, especially in an era where online learning is increasingly becoming a key component of the educational landscape. The study's findings and recommendations serve as a foundation for ongoing efforts to enhance online learning experiences, ensuring they are effective, inclusive, and accessible to all students.

References

Abdullah, M. S., & Toycan, M. (2017). Analysis of the factors for the successful E-learning services adoption from education providers' and students' perspectives: A case study of private universities in northern iraq. *Eurasia Journal of Mathematics, Science and Technology Education*, *14*(3), 1097-1109. https://doi.org/10.12973/ejmste/81554

Al-Emran, M., Mezhuyev, V., & Kamaludin, A. (2018). Technology acceptance model in M-learning context: A systematic review. *Computers & Education*, *125*, 389-412. https://doi.org/10.1016/j.compedu.2018.06.008

Almaiah, M. A., & Alismaiel, O. A. (2019). Examination of factors influencing the use of mobile learning system: An empirical study. *Education and Information Technologies*, *24*(1), 885-909. https://doi.org/10.1007/s10639-018-9810-7

Almaiah, M. A., Al-Khasawneh, A., & Althunibat, A. (2020). Exploring the critical challenges and factors influencing the E-learning system usage during COVID-19 pandemic. *Education and Information Technologies*, *25*(6), 5261-5280. https://doi.org/10.1007/s10639-020-10219-y

Alqurashi, E. (2019). Predicting student satisfaction and perceived learning within online learning environments. *Distance Education*, *40*(1), 133-148. https://doi.org/10.1080/01587919.2018.1553562

Ang, W. H. D., Chew, H. S. J., Dong, J., Yi, H., Mahendren, R., & Lau, Y. (2022). Digital training for building resilience: Systematic review, meta-analysis, and meta-regression. *Stress and Health*, *38*(5), 848-869. https://doi.org/10.1002/smi.3154

Ang, W. H. D., Lau, S. T., Cheng, L. J., Chew, H. S. J., Tan, J. H., Shorey, S., & Lau, Y. (2022). Effectiveness of resilience interventions for higher education students: A meta-analysis and metaregression. *Journal of Educational Psychology*, *114*(7), 1670-1694. https://doi.org/10.1037/edu0000719

Arbaugh, J. B. (2000). Virtual classroom characteristics and student satisfaction with internet-based MBA courses. *Journal of Management Education*, *24*(1), 32-54. https://doi.org/10.1177/105256290002400104

Arbaugh, J. B., & Rau, B. L. (2007). A study of disciplinary, structural, and behavioral effects on course outcomes in online MBA courses. *Decision Sciences Journal of Innovative Education*, *5*(1), 65-95. https://doi.org/10.1111/j.1540-4609.2007.00128.x

Ayu M. (2020). Online learning: Leading e-learning at higher education. *The Journal of English Literacy Education*, *7*(1), 47-54.

Baber H. (2020). *Social Interaction and Effectiveness of the Online Learning—A Moderating Role of Maintaining Social Distance during the Pandemic COVID-19* (SSRN Scholarly Paper 3746111). https://doi.org/10.2139/ssrn.3746111

Bervell, B., & Umar, I. N. (2017). A decade of LMS acceptance and adoption research in sub-sahara african higher education: A systematic review of models, methodologies, milestones and main challenges. *EURASIA Journal of Mathematics, Science and Technology Education*, *13*(11). https://doi.org/10.12973/ejmste/79444

Conrad, C., Deng, Q., Caron, I., Shkurska, O., Skerrett, P., & Sundararajan, B. (2022). How student perceptions about online learning difficulty influenced their satisfaction during canada's covid-19 response. *British Journal of Educational Technology*, *53*(3), 534-557. https://doi.org/10.1111/bjet.13206

Dung D. T. H. (2020). The advantages and disadvantages of virtual learning. *IOSR Journal of Research & Method in Education*, *10*(3), 45-48. https://doi.org/10.9790/7388-1003054548

El-Masri, M., & Tarhini, A. (2017). Factors affecting the adoption of e-learning systems in qatar and USA: Extending the unified theory of acceptance and use of technology 2 (UTAUT2). *Educational Technology Research and Development*, *65*(3), 743-763. https://doi.org/10.1007/s11423-016-9508-8

Escobar-Rodriguez, T., & Monge-Lozano, P. (2012). The acceptance of moodle technology by business administration students. *Computers & Education*, *58*(4), 1085-1093. https://doi.org/10.1016/j.compedu.2011.11.012

Fatani, T. H. (2020). Student satisfaction with videoconferencing teaching quality during the COVID-19 pandemic. *BMC Medical Education*, *20*(1), 396. https://doi.org/10.1186/s12909-020-02310-2

Fiock, H. (2020). Designing a community of inquiry in online courses. *The International Review of Research in Open and Distributed Learning*, *21*(1), 135-153. https://doi.org/10.19173/irrodl.v20i5.3985

Fitzpatrick, S., & Kuo, J. R. (2022). Predicting the effectiveness of engagement and disengagement emotion regulation based on emotional reactivity in borderline personality disorder. *Cognition & Emotion*, *36*(3), 473-491. https://doi.org/10.1080/02699931.2021.2018291

Fu, J., Jiang, S., & Deeprasert, J. (2023). Exploring the Adoption of Blended Learning in Physical Education: A Study in Southwest China's Higher Education Institutions. *International Journal on Recent and Innovation Trends in Computing and Communication*, *11*(10), 2421-2443. https://doi.org/https://ijritcc.org/index.php/ijritcc/article/view/9044

Gopal, R., Singh, V., & Aggarwal, A. (2021). Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19. *Education and Information Technologies*, *26*(6), 6923-6947. https://doi.org/10.1007/s10639-021-10523-1

Granić, A., & Marangunić, N. (2019). Technology acceptance model in educational context: A systematic literature review. *British Journal of Educational Technology*, *50*(5), 2572-2593. https://doi.org/10.1111/bjet.12864

Gunasinghe, A., Hamid, J., Khatibi, A., & Azam, S. M. (2019). Academicians' acceptance of online learning environments: A review of information system theories and models. *Global Journal of Computer Science and Technology*, 31-39. https://doi.org/10.34257/GJCSTHVOL19IS1PG31

Hannum E. (2023). *Educational development in china: Progress, challenges, and outlook*.

Hilliger I., De Laet T., Henriquez V., Guerra J., Ortiz M., Zúñiga M., Baier J., & Pérez-Sanagustín M. (2020). *For learners, with learners: Identifying indicators for an academic advising dashboard for students* (pp. 117-130). https://doi.org/10.1007/978-3-030-57717-9_9

Jiang, S., & Pu, R. (2021). Reconceptualizing and modeling sustainable consumption behavior: A synthesis of qualitative evidence from online education industry. *Innovative Marketing*, *17*(3), 144-156. https://doi.org/10.21511/im.17(3).2021.12

Jiang, S., Jotikasthira, N., & Pu, R. (2022). Toward sustainable consumption behavior in online education industry: The role of consumer value and social identity. *Frontiers in Psychology*, *13*, 865149. https://doi.org/10.3389/fpsyg.2022.865149

Jiang, S., Jotikasthira, N., & Pu, R. (2022). Toward Sustainable Consumption Behavior in Online Education Industry: The Role of Consumer Value and Social Identity [Original Research]. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.865149

Kaushik, D., & Lipton, Z. C. (2018). *How much reading does reading comprehension require? A critical investigation of popular benchmarks* (arXiv:1808.04926). arXiv. https://doi.org/10.48550/arXiv.1808.04926

Khechine, H., Lakhal, S., & Ndjambou, P. (2016). A meta-analysis of the UTAUT model: Eleven years later. *Canadian Journal of Administrative Sciences / Revue Canadienne Des Sciences de l'Administration*, *33*(2), 138-152. https://doi.org/10.1002/cjas.1381

Lanlan, Z., Ahmi, A., & Popoola, O. M. J. (2019). Perceived ease of use, perceived usefulness and the usage of computerized accounting systems: A performance of micro and small enterprises (MSEs) in china. *International Journal of Recent Technology and Engineering*, *8*(2S2), 324-331. https://doi.org/10.35940/ijrte.B1056.0782S219

Li J., Li D., Xiong C., & Hoi S. (2022). *BLIP: Bootstrapping language-image pre-training for unified vision-language understanding and generation*. 12888-12900. https://proceedings.mlr.press/v162/li22n.html

Megat Abdul Rahim P. R., Idris S. L., Abdul Rahman Z. I., Ya Shaq M. S., & Nasir N. F. (2021). Approaching listening and speaking skills using online to facilitate interactive learning from students' perspectives / puteri rohani megat abdul rahim … [et al.]. *Asian Journal of University Education (AJUE)*, *7*(2), Article 2. Retrieved from https://myjms.mohe.gov.my

Ming, L., Jotikasthira, N., & Songyu, J. (2023). Migration Factors Impacting Instructors' Intention to Utilize Digital Tools for Teaching Sustainable Development. *Migration Letters*, *20*(S8), 1300-1316. https://doi.org/10.59670/ml.v20iS8.5264

Moore, M. G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education*, *3*(2), 1-7. https://doi.org/10.1080/08923648909526659

Nortvig A., Petersen A. K., & Balle S. (2018). A literature review of the factors influencing e-learning and blended learning in relation to learning outcome, student satisfaction and engagement. *Electronic Journal of e-Learning*. Retrieved from https://www.semanticscholar.org/paper/A-literature-review-of-the-factors-influencing-and-Nortvig-Petersen/1462df81936e74422d9d365b851c769a72784222

Oliveira, T., Alhinho, M., Rita, P., & Dhillon, G. (2017). Modelling and testing consumer trust dimensions in e-commerce. *Computers in Human Behavior*, *71*, 153-164. https://doi.org/10.1016/j.chb.2017.01.050

Olivia, M., & Marchyta, N. K. (2022). The influence of perceived ease of use and perceived usefulness on E-wallet continuance intention: Intervening role of customer satisfaction. *Jurnal Teknik Industri*, *24*(1), 13-22. https://doi.org/10.9744/jti.24.1.13-22

Pal, D., & Vanijja, V. (2020). Perceived usability evaluation of microsoft teams as an online learning platform during COVID-19 using system usability scale and technology acceptance model in india. *Children and Youth Services Review*, *119*, 105535. https://doi.org/10.1016/j.childyouth.2020.105535

Panergayo A. A. (2021). *Students' behavioral intention to use learning management system: The mediating role of perceived usefulness and ease of use* (SSRN Scholarly Paper 3971279). Retrieved from https://papers.ssrn.com/abstract=3971279

Patricia Aguilera-Hermida, A. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, *1*, 100011. https://doi.org/10.1016/j.ijedro.2020.100011

Peimani, N., & Kamalipour, H. (2021). Online education in the post COVID-19 era: Students' perception and learning experience. *Education Sciences*, *11*(10), 633. https://doi.org/10.3390/educsci11100633

Picciano, A. (2002). Beyond student perceptions: Issues of interaction, presence, and performance in an online course. *JALN Volume*, *6*(1). https://doi.org/10.24059/olj.v6i1.1870

Pu, R., & Jiang, S. (2021). Understanding the consumption behaviors in online education towards promoting the sustainable development goals (SDGs). *Academy of Entrepreneurship Journal*, *27*(6), 1-16.

Pu, R., Tanamee, D., & Jiang, S. (2022). Digitalization and higher education for sustainable development in the context of the Covid-19 pandemic: A content analysis approach. *Problems and Perspectives in Management*.

Rahayu, R. P., & Wirza, Y. (2020). Teachers' perception of online learning during pandemic covid-19. *Jurnal Penelitian Pendidikan*, *20*(3), 392-406. https://doi.org/10.17509/jpp.v20i3.29226

Rajeh, M. T., Abduljabbar, F. H., Alqahtani, S. M., Waly, F. J., Alnaami, I., Aljurayyan, A., & Alzaman, N. (2021). Students' satisfaction and continued intention toward e-learning: A theory-based study. *Medical Education Online*, *26*(1), 1961348. https://doi.org/10.1080/10872981.2021.1961348

Rawashdeh, A. Z. A., Mohammed, E. Y., Arab, A. R. A., Alara, M., & Al-Rawashdeh, B. (2021). Advantages and disadvantages of using e-learning in university education: Analyzing students' perspectives. *Electronic Journal of E-Learning*, *19*(3), Article 3. https://doi.org/10.34190/ejel.19.3.2168

Richardson, J. C., & Swan, K. (2003). Examining social presence in online courses in relation to students' perceived learning and satisfaction. *Online Learning*, *7*(1), Article 1. https://doi.org/10.24059/olj.v7i1.1864

Saxena, C., Baber, H., & Kumar, P. (2021). Examining the moderating effect of perceived benefits of maintaining social distance on E-learning quality during COVID-19 pandemic. *Journal of Educational Technology Systems*, *49*(4), 532-554. https://doi.org/10.1177/0047239520977798

Shamir-Inbal, T., & Blau, I. (2021). Facilitating emergency remote K-12 teaching in computing-enhanced virtual learning environments during COVID-19 pandemic—Blessing or curse? *Journal of Educational Computing Research*, *59*(7), 1243-1271. https://doi.org/10.1177/0735633121992781

Šumak, B., & Šorgo, A. (2016). The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre- and post-adopters. *Computers in Human Behavior*, *64*, 602-620. https://doi.org/10.1016/j.chb.2016.07.037

Šumak, B., & Šorgo, A. (2016). The acceptance and use of interactive whiteboards among teachers: Differences in UTAUT determinants between pre-and post-adopters. *Computers in Human Behavior*, *64*, 602-620.

Sun, P.-C., Tsai, R. J., Finger, G., Chen, Y.-Y., & Yeh, D. (2008). What drives a successful e-learning? An empirical investigation of the critical factors influencing learner satisfaction. *Computers & Education*, *50*(4), 1183-1202. https://doi.org/10.1016/j.compedu.2006.11.007

Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education*, *22*(2), 306-331. https://doi.org/10.1080/0158791010220208

Swan, K., Matthews, D., Bogle, L., Boles, E., & Day, S. (2012). Linking online course design and implementation to learning outcomes: A design experiment. *Internet and Higher Education*, *15*(2), 81-88. https://doi.org/10.1016/j.iheduc.2011.07.002

Tarhini, A., Hone, K., Liu, X., & Tarhini, T. (2017). Examining the moderating effect of individual-level cultural values on users' acceptance of E-learning in developing countries: A structural equation modeling of an extended technology acceptance model. *Interactive Learning Environments*, *25*(3), 306-328. https://doi.org/10.1080/10494820.2015.1122635

Tlili, A., Huang, R., Chang, T.-W., Nascimbeni, F., & Burgos, D. (2019). Open educational resources and practices in china: A systematic literature review. *Sustainability*, *11*(18), Article 18. https://doi.org/10.3390/su11184867

Unal, E., & Uzun, A. M. (2021). Understanding university students' behavioral intention to use edmodo through the lens of an extended technology acceptance model. *British Journal of Educational Technology*, *52*(2), 619-637. https://doi.org/10.1111/bjet.13046

Wang, S., Phakdeephirot, N., & Jiang, S. (2023). The Structural Equation Model of Willingness to Continue Using Online Education Platform Evidence from Chongqing City, China. *Journal of Reproducible Research*, *2*(1), 189-194. Retrieved from https://journalrrsite.com/index.php/Myjrr/article/view/51

Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Computers in Human Behavior*, *67*, 221-232. https://doi.org/10.1016/j.chb.2016.10.028

Yilmaz, R. (2017). Exploring the role of e-learning readiness on student satisfaction and motivation in flipped classroom. *Computers in Human Behavior*, *70*, 251-260. https://doi.org/10.1016/j.chb.2016.12.085

Ying, M., & Wright, E. (2023). Outsourced concerted cultivation: International schooling and educational consulting in china. *International Studies in Sociology of Education*, *32*(3), 799-821. https://doi.org/10.1080/09620214.2021.1927143

Yu, J., Jiang, S., Han, J., Li, L., & Ke, X. (2023). Promoting digital employment intention among students of Chinese higher education institutions. *Problems and Perspectives in Management*, *21*(3), 22-39.

https://doi.org/10.21511/ppm.21(3).2023.03

Zhai, Y., Yang, H., & Jiang, S. (2023). An Empirical Investigation into the Determinants of Student Participation in Virtual Reality-Based Practical Training Programs at Yellow River Conservancy Technical Institute. *International Journal of Education and Humanities*, *11*(1), 88-93.

Acknowledgments

We greatly appreciate the valuable contributions of our community advisory committee members.

Authors contributions

Mr. Shi and Dr. Thitinant were responsible for study design and revising. Mr. Shi was responsible for data collection. Mr. Shi and Dr. Thitinant drafted the manuscript and Dr. Thitinant revised it. All authors read and approved the final manuscript. In this paragraph, also explain any special agreements concerning authorship, such as if authors contributed equally to the study.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.