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Investigating the Factors That Sustain College Teachers' Attitude and Behavioral Intention toward Online Teaching

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Abstract: Online teaching is considered an important approach for achieving sustainable learning and education, and college teachers' attitude and behavioral intention are essential for the sustainable adoption of online teaching practice in higher education institutions. To examine the influencing factors that sustain teachers' attitude toward online teaching and behavioral intention, we conducted a cross-sectional study based on a sample of 1102 college teachers in Central China using hierarchical linear regression analysis to explore the possible influencing factors at the following four levels: individual experience, environmental support, self-perception, and technology acceptance. The study results show that the subjective norms, readiness, beliefs, and perceived usefulness of online teaching had a significant impact on the teachers' attitude toward online teaching and behavioral intention. Nevertheless, the effect varied with factors like the online teaching load and teachers' technology self-efficacy, and their influence seemed to be singular, affecting the teachers' attitude toward online teaching or behavioral intention exclusively. In contrast, previous online teaching experience did not notably affect either. The findings of this study reveal the complex interactions of the factors that influence college teachers' disposition toward and decisions about online teaching practices and emphasize the need for targeted strategies to maintain and enhance online education in the post-pandemic era.

Keywords: online teaching; higher education; attitude; behavioral intention; hierarchical linear regression

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1. Introduction

Online teaching, with its potential to provide accessible, flexible, timely, and lifelong learning opportunities [1,2], is considered an essential approach for achieving sustainable learning and education [3,4]. Although online teaching initiatives such as online courses, e-learning programs, and massive open online courses (MOOCs) have witnessed a steady increase in the higher education sector since 2000 [5–7], the COVID-19 pandemic in spring 2020 induced a rapid transition from face-to-face lessons to online teaching at colleges and universities globally [8–10]. While some researchers labeled online teaching during COVID-19 as emergency remote teaching because it was temporary and lacked careful planning [11,12], others argued that the online teaching experience would have a lasting effect on both teachers and students and that it would continue in the post-pandemic era in the forms of blended, flipped, or virtual classrooms [13–15].

However, despite the various proven advantages of online teaching, such as enhanced accessibility, flexibility, convenience, and efficiency, its sustained adoption and routine implementation in higher education institutions remain challenging. As predicted by scholars such as Daniel [16] and Hargreaves [17], the cessation of the pandemic has already led many universities to revert to their offline teaching norms [18]. This reverse transition can cause many issues for sustainable learning and education. (1) It hinders the sustainable

development of students' key competencies, such as lifelong learning and digital literacy; (2) it results in significant wastage of accumulated online resources and technological tools; (3) it forfeits the unique benefits of online teaching for delivering more equitable, flexible, and personalized education; and (4) it leaves universities vulnerable to similar crises or emergencies in the future. Therefore, it is highly necessary to sustain online teaching in the post-pandemic era.

The continued application of online teaching in higher education relies heavily on teachers' favorable attitude toward online teaching and strong behavioral intention. Teachers' attitude toward online teaching reflects their overall disposition toward online teaching, including their openness to computer-mediated communication and digital technologies [19]. A positive attitude toward online teaching is often associated with increased motivation and achievement goals in designing effective online courses [8,20]. Behavioral intention, in contrast, concerns teachers' willingness to engage in online teaching and directly impacts the frequency of actual practice [21,22]. Teachers with a strong online teaching intention tend to report higher levels of work engagement and satisfaction [23,24]. Because university faculties' attitude toward online teaching and behavioral intention for online teaching directly affects the motivation, effort, and success of online teaching, this is crucial for the sustainable development of online education; even in the post-pandemic era, where online learning is no longer a requirement, college teachers with a positive attitude and behavioral intention will continue to attempt online teaching activities during the teaching process, thus transforming online learning or blended learning into the new norm in higher education. Therefore, online teaching attitude and behavioral intention research merits our special attention.

Nevertheless, the existing research on online higher education has largely focused on students' acceptance and experiences of online learning, with inadequate attention having been paid to the teachers' perspectives. Large-sample research studies that have investigated the influencing factors of college teachers' attitude toward online teaching and behavioral intention for online teaching remain scarce. Furthermore, most studies have only examined college teachers' attitude or behavioral intention, without making a strict distinction between these two aspects when identifying their influencing factors. There has been a lack of comparative analysis examining the variations in these influencing factors, hindering a sophisticated understanding of this complex phenomenon. To address this research gap, we conducted a cross-sectional study on 1102 college teachers in Central China who had engaged in a semester-long online teaching project, and we utilized hierarchical linear regression analysis to investigate the factors that sustain their attitude and behavioral intention for online teaching. In particular, the following questions guided our investigation:

1. What are the possible factors that significantly predict college teachers' attitude toward online teaching, and to what extent?
2. What are the possible factors that significantly predict college teachers' behavioral intention to teach online, and to what extent?
3. How do the factors predicting college teachers' online teaching attitude differ from those predicting college teachers' behavioral intention?

2. Literature Review

2.1. Online Teaching

Online teaching is conducted in an online environment through the use of the Internet for teaching and learning, allowing for interactions between students and teachers [7], and it transcends physical location and time constraints, providing a flexible, convenient mode for learning. While online teaching was performed in colleges before the COVID-19 pandemic, the outbreak of the pandemic accelerated the development and adoption of online education, introducing it to a vast number of students, teachers, and parents. According to the Global Education Monitoring Report summary released by the United Nations Educational, Scientific, and Cultural Organization (UNESCO), the number of students

participating in massive open online courses (MOOCs) increased from 0 in 2012 to at least 220 million in 2021. Globally, the proportion of Internet users rose from 16% in 2005 to 66% in 2022. In 2022, about 50% of middle schools worldwide had Internet access for teaching purposes [25]. Moreover, 186 countries had implemented distanced learning programs, ensuring the continuity of education during the COVID-19 pandemic to some extent [26]. As noted in the global education monitoring report summary, the COVID-19 pandemic can be viewed as a natural experiment, with learning throughout the education system being moved online almost overnight [25].

In the post-pandemic era, despite students' return to traditional physical classrooms, online teaching still holds potential for sustainable development. Online teaching offers many advantages, such as flexibility [27], by allowing teaching to break time and space constraints, and convenience [28], by enabling students to easily contact teachers and use resources. During the lockdowns, both students and teachers agreed that online learning had fostered student-centered learning. With the flexibility of asynchronous learning, students have become autonomous learners who are able to study at any time of day [28,29]. In the post-pandemic era, online learning, combined with traditional classrooms, has spawned many new teaching models, transferring these advantages into blended learning and flipped classrooms and becoming part of regular teaching. Additionally, some universities utilize the summer vacation to offer online courses, giving greater flexibility to students who work full time or have temporarily relocated, enabling them to maintain or even accelerate their degree progress [30]. Online teaching can also be applied in emergency situations [14], such as future pandemics, earthquakes, or other school disruptions. In these times, online teaching is the best choice for continuing instruction [31].

2.2. Teachers' Attitude toward Online Teaching and Behavioral Intention

Attitude can be reflected through emotions, cognition, and behavior [32], but holding a particular attitude does not always translate into a corresponding behavior. Therefore, researchers tend to measure attitude from affective and cognitive perspectives. For instance, Crites et al. [33] emphasized the importance of affective and cognitive attributes in attitude measurement. Researchers have also recognized the positive impact of attitude on behavioral implementation [34] and have conducted numerous studies on the topic of attitude. For example, many researchers have aimed to develop reliable and comprehensive tools to measure the attitude toward computer use or the use of information and communication technologies [35–37]. Moreover, teachers' attitude toward online teaching encompasses their cognitive evaluation and emotional response toward online teaching. Most studies have not directly explored college teachers' attitude toward online teaching, instead focusing on the attitude toward the sudden shift to online teaching during the COVID-19 pandemic [8,38].

Behavioral intention denotes the degree to which individuals consciously choose to engage in a specific future activity [39]. In this study, we focused on teachers' behavioral intention for online teaching, which refers to the extent to which they are willing to continue engaging in online teaching activities. In recent years, research on teachers' behavioral intention for online teaching has mainly been based on supplementing or extending the technology acceptance model, exploring the relationships between factors such as the perceived usefulness and perceived ease of use of online teaching technologies, attitude, subjective norms, and their impact on behavioral intention to teach online [21,40,41].

Attitude significantly influences behavioral intention [42] because a more positive attitude strengthens the intention to take action [43]. Despite the strong link between attitude and behavioral intention, there are several differences between online teaching attitude and behavioral intention. First, as mentioned earlier, attitude is usually a broader concept, involving teachers' overall cognition, emotion, and behavioral tendency toward online teaching, while behavioral intention is more specific, involving teachers' specific decision about whether to engage in online teaching. Second, the formation of attitude can be influenced by various factors, including personal experiences, educational backgrounds,

and professional motivations, among others. In contrast, behavioral intention may be more constrained by practical situations and external conditions. This is similar to the phenomenon whereby many consumers hold a positive attitude about products, but do not ultimately purchase them [44].

2.3. Potential Predictors of Teachers' Attitude toward Online Teaching and Behavioral Intention

This study examined the predictors of teachers' attitude toward online teaching and behavioral intention for online teaching, highlighting the distinctions and commonalities between these two constructs. The potential predictors are as follows:

2.3.1. Perceived Usefulness and Perceived Ease of Use

Considerable research has been conducted to examine the determinants that influence college teachers' attitude toward online teaching and behavioral intention. However, a predominant focus has been placed on the technology acceptance model (TAM), encompassing factors such as educational technology, work environment, individual self-cognition, and social cognition. Notably, educational technology, serving as a fundamental instrument for delivering online instruction, assumes a pivotal role in shaping online teaching attitudes and behavioral intentions. Teo [45] revealed that perceived usefulness and perceived ease of use significantly impacted computer use attitudes. Similarly, Al-Maroof et al. [46] discovered that perceived ease of use and perceived usefulness significantly impacted the behavioral intention toward using Google Translate. These studies have examined the adoption of diverse technologies and platforms, aligning with the TAM. This model emphasizes that perceived usefulness and perceived ease of use are the core determinants of information technology. Despite variations in the target populations, we posit that the impact of perceived usefulness and perceived ease of use is transferable across different technologies or platforms. Consequently, we deduce that perceived usefulness and perceived ease of use are potential factors that influence teachers' attitude toward online teaching and behavioral intention for online teaching.

2.3.2. Subjective Norms and Facilitating Condition

Perceived support from the teaching environment, including subjective norms and facilitating conditions, significantly influences teachers' attitude toward online teaching and behavioral intention for online teaching. The research of Ballone and Czerniak [47] highlighted the influence of subjective norms on teachers' behavioral intention regarding the implementation of teaching strategies. Subjective norms, as defined by Fishbein and Ajzen [48], refer to individuals' perception of the expectations of important figures for them to perform certain behaviors. This perception involves individuals feeling pressure to perform specific behaviors and the motivation to bow to this pressure. Therefore, we posit that when teachers perceive the broad acceptance and recognition of online teaching, their motivation and willingness to engage in it are enhanced. Teo [45] found that besides the subjective norms, the facilitating conditions also had a direct and significant impact on computer use attitude, and they may indirectly affect computer use attitude by affecting the perceived usefulness and perceived ease of use. A facilitating condition denotes the favorable factors present in the external environment, including resources (such as time and money) and technical factors (such as compatibility), which also influences teachers' online teaching attitude and behavioral intention.

2.3.3. Previous Online Teaching Experience and Online Teaching Load

The individual experience level of college teachers plays a significant role in shaping their attitude toward online teaching and behavioral intention to teach online. Previous online teaching experience refers to a teacher's past experience in conducting online classes before the pandemic. Hebert et al. [49] highlighted that teachers lacking online teaching experience perceive a more pronounced negative impact of the pandemic on their teaching performance. The absence of familiarity with online teaching may cause teachers to feel

uneasy or confused about how to effectively deliver knowledge online. Such concerns can diminish their interest in engaging in future online teaching and can even generate resistance. Regarding the online teaching load, while the specific connection between this and the attitude toward online teaching or behavioral intention has not been extensively investigated, Medina-Guillen et al. [50] proposed that the transition from face-to-face lessons to online teaching has increased the workload for online teachers. This increased workload encompasses content preparation, teaching delivery, technical issues, and the dedication of more time to online student communication. These additional burdens have the potential to impact teachers' online teaching attitude and behavioral intention to engage in online teaching practice.

2.3.4. Teachers' Technology Self-Efficacy, Readiness, and Belief

The social cognitive theory (SCT) provides a framework for comprehending how teachers' self-awareness influences their attitude toward online teaching and behavioral intention for online teaching. The SCT posits continuous interaction between personal cognition and behavior [51]. Hence, teachers' technology self-efficacy, beliefs, and readiness can shape teachers' attitude toward online teaching and behavioral intention for online teaching. Technology self-efficacy refers to teachers' confidence in effectively utilizing technology. Compeau and Higgins [52] stressed the crucial role of individual beliefs in forming computer usage habits, which is termed computer self-efficacy. Further research has confirmed the positive impact of computer self-efficacy on computer use [53]. In this study, teachers' technology self-efficacy pertains to teachers' confidence in effectively using online teaching platforms. Teachers' beliefs reflect their understanding of the value and significance of online teaching. These beliefs stem from their endorsement of online teaching and their comprehension of student learning styles and effectiveness. Liu et al. [54] integrated teacher beliefs into the TAM, affirming their significant influence on the attitude toward information and communication technologies (ICT). Teachers' readiness reflects their preparedness [55], including familiarity and preparation in terms of teaching resources, tools, and technologies. Insufficient readiness may induce unease or a lack of confidence among teachers, thereby impacting their attitude toward online teaching and behavioral intention.

3. Method

3.1. Research Context and Participants

The COVID-19 outbreak, which commenced in December 2019, resulted in widespread lockdowns across China, confining individuals to their homes. In response, the "Suspending Classes Without Stopping Learning" policy introduced by the Ministry of Education of China [56] catalyzed the extensive adoption of online teaching for the 2020 spring semester. Between June and July 2020, most college teachers gradually concluded their online teaching for the semester, providing a window of opportunity for this study to conduct a survey on their online teaching experiences during this period.

A total of 1127 college teachers participated in this survey, 1063 being from colleges and universities located in Hubei. This study focused on university teachers in Hubei for three main reasons. First, Hubei Province was the earliest region to report the COVID-19 outbreak and was the most severely affected. Universities in Hubei experienced the longest duration of lockdowns; hence, the online teaching period was also the longest. Therefore, these teachers' experiences and perceptions of online teaching would be the most representative. Second, Hubei's economic status is at a mid-level nationally, with a diverse and comprehensive range of regional universities, making the survey data more representative. Third, since our research team is based at a university in Hubei, focusing on teachers from local universities allowed for convenient sampling, which not only simplified the research process, but also promised a higher response rate.

3.2. Research Design

This study employed a cross-sectional design to explore the possible factors that predict college teachers' online teaching attitude and behavioral intention. A cross-sectional study is a form of observational research that mainly focuses on collecting and analyzing data from a large population at a specific time point or in a short period of time [57,58]. Due to the ability to collect data from a large population simultaneously, cross-sectional studies can investigate the relationships between different variables in various contexts. In this study, the predictor variables include previous online teaching experience, online teaching load, subjective norms for online teaching, facilitating condition, teachers' technology self-efficacy, readiness, perceived ease of use, and perceived usefulness.

3.3. Instruments

The online teaching experience (OTE) questionnaire used in this survey comprises 60 questions and is divided into two parts. The first section contains seven questions focusing on the following demographic variables that may potentially influence college teachers' online teaching experience: gender, age, previous online teaching, location of home-based teaching, educational background, academic titles, and the online teaching load of college teachers.

The second section of the OTE questionnaire comprises 53 five-point Likert scale questions, measuring the teachers' online teaching experience across nine scales as follows: (1) subjective norms (SNs) for online teaching (three items), which were adapted from a questionnaire assessing teachers' subjective perception norms for creative software [59], (2) Teachers' technology self-efficacy (TTSE) (seven items), which was based on the questionnaire measuring the technology knowledge dimension in the Technological Pedagogical Content Knowledge (TPACK) framework [60]. (3) The facilitating condition (FC) (seven items), which was adapted from a teacher technology questionnaire assessing overall support and technical support within the school [61]. (4) Perceived ease of use (PEU) (six items), which was adapted from Davis' measure of perceived ease of use for computer technology [62]. Perceived ease of use is a pivotal concept within the TAM [63]. (5) Perceived usefulness (PU) (five items), which was adapted from Davis's measure of perceived usefulness for computer technology [60]. This construct is likewise considered a pivotal concept within the TAM [63]. (6) Attitude toward online teaching (ATT) (eight items), which was adapted from the cognitive and affective trait scale for assessing attitude [33]. (7) Behavioral intention (BI) for online teaching (five items), which was determined from the questionnaire for measuring behavioral intention for e-learning [64]. (8) Readiness (RD) for online teaching (four items), which was adapted from the teacher technology questionnaire on teachers' readiness to integrate technology [61]. (9) Belief in online teaching (eight items), which was based on a teacher technology questionnaire assessing the impact on classroom instruction and impact on students [61]. The complete questionnaire items are listed in Appendix A.

The OTE questionnaire was distributed through an online platform to facilitate responses from the college teachers at all times and locations. We leveraged social media to promote the survey and expand the sample size. A total of 1127 teachers completed the OTE questionnaire, but we excluded those who answered the questionnaire too quickly and those who chose the same option for all items. Ultimately, 1102 valid data points were collected, resulting in a questionnaire validity rate of 97.8%.

3.4. Data Analysis

The questionnaire utilized in this research underwent reliability and validity analyses through the utilization of IBM SPSS software (version 27) and AMOS software (version 26). Descriptive statistical analysis of the demographic variables, as well as correlation analysis of the measured independent variables, were conducted using IBM SPSS software (version 27). Moreover, hierarchical multiple-regression analysis was performed utilizing IBM SPSS (version 27), incorporating variables across the following four levels: individual experience,

environmental support, self-perception, and technology acceptance. This is primarily due to the fact that these four levels encompass both internal and external factors that influence the teachers' attitude and behavioral intention toward online learning. Furthermore, the interaction and mutual influence among these levels collectively constitute a complex system of teachers' online learning behaviors. This comprehensive analysis sought to identify and prioritize the key predictors of the college teachers' online teaching attitude and behavioral intention.

4. Results

4.1. Reliability and Validity of the Questionnaire

Preliminary analysis of the reliability and validity of the OTE questionnaire was conducted, and the reliability and validity results of each sub-scale are shown in Table 1. The reliability of the questionnaire was assessed using Cronbach's alpha, with values above 0.80 indicating good reliability [65]. As shown in Table 1, the Cronbach's alpha value for the entire questionnaire and its sub-scales was larger than 0.8, suggesting good reliability for the overall instrument and the individual construct measurement.

Table 1. Key statistics of the questionnaire reliability and validity.

Constructs	Items	α	Factor Loading	CR	AVE	$\sqrt{AVE}$
SN	3	0.807	[0.673–0.840]	0.811	0.591	0.769
TTSE	7	0.910	[0.734–0.806]	0.913	0.599	0.773
FC	7	0.879	[0.633–0.783]	0.882	0.518	0.720
PEU	6	0.894	[0.725–0.808]	0.895	0.587	0.766
PU	5	0.919	[0.795–0.868]	0.919	0.695	0.834
RD	4	0.892	[0.753–0.876]	0.897	0.687	0.829
Belief	8	0.945	[0.689–0.891]	0.946	0.687	0.829
ATT	8	0.956	[0.752–0.909]	0.957	0.734	0.857
BI	5	0.915	[0.683–0.914]	0.931	0.731	0.855

Note: SN, subjective norms for online teaching; TTSE, teachers' technology self-efficacy; FC, facilitating condition; PEU, perceived ease of use; PU, perceived usefulness; RD, readiness; ATT, attitude toward online teaching; BI, behavioral intention for online teaching.

The validity of a questionnaire comprises its convergent validity and discriminant validity [66]. Acceptable convergent validity requires factor loadings greater than 0.7, a composite reliability (CR) greater than 0.6, and average variance extraction (AVE) greater than 0.5 [67]. Acceptable discriminant validity requires the square root of the AVE ($\sqrt{AVE}$) to be greater than its correlation coefficients with the other constructs [68]. As shown in Table 1, those requirements were fulfilled, suggesting good validity of the questionnaire.

4.2. Descriptive and Correlational Statistics

The distribution of demographic variables among the 1102 participants who completed the survey is comprehensively outlined in Table 2. Overall, the distribution of these variables aligned with our current understanding of the Chinese college teachers, indicating that the sample population is representative. At the individual level, the gender distribution among the participating educators was relatively balanced, and the age distribution closely approximated a normal distribution. In terms of the teachers' educational backgrounds, the location of online teaching was concentrated in cities, and the sample teachers possessed relatively high-level educational qualifications. Notably, we discovered that 43.5% of the sampled teachers had never participated in online teaching. A plausible explanation for this observation is that prior to the outbreak of COVID-19, online teaching was not widely embraced in China, as many teachers were skeptical of its feasibility and utility due to the concerns of unreliable access and cheating behaviors. This accounts for the limited extent of online teaching experience among the sampled college teachers. However, the distribution of the teachers' location, educational backgrounds, and academic titles lacked

variance, and their correlations with outcome variables were deemed too small. Therefore, no further analysis of these five demographic variables was conducted in this study.

Table 2. Survey participants' demographic information.

Variables	Category
Gender	Male (n = 503) Female (n = 599)
Age (year)	20–35 (n = 197) 36–49 (n = 631) ≥50 (n = 274)
Previous online teaching experience	Never (n = 479) Occasionally (n = 314) Sometimes (n = 101) Often (n = 65) Usually (n = 143)
Location	Provincial capital (n = 614) Prefecture-level city (n = 360) County seat (n = 49) Township (n = 21) Village (n = 58)
Educational background	Bachelor's degree or below (n = 320) Master's degree (n = 623) Doctor's degree and above (n = 153) Other educational background (n = 6)
Academic title	Assistant (n = 92) Lecturer (n = 423) Associate Professor (n = 462) Professor (n = 85) Other academic titles (n = 40)
Online teaching load	less than 1 h (n = 36) 1–3 h (n = 129) 4–6 h (n = 211) 7–9 h (n = 155) 10–12 h (n = 197) more than 12 h (n = 374)

The correlation and correlation coefficients between the nine scales, excluding previous online teaching experience and online teaching load (which are noncontinuous variables measured in the first section of the questionnaire), are presented in Table 3. The results clearly demonstrate a statistically significant positive correlation among these nine scales, whereby the correlation coefficients ranged from 0.51 to 0.82. This indicates a relatively strong relationship between these scales, suggesting the potential for mutual influence or shared underlying factors.

Table 3. Means, standard deviations, and correlations of the key constructs.

Constructs	1	2	3	4	5	6	7	8	9
1 SN	1								
2 FC	0.64 ***	1							
3 TTSE	0.52 ***	0.60 ***	1						
4 RD	0.51 ***	0.62 ***	0.68 ***	1					
5 Belief	0.63 ***	0.66 ***	0.55 ***	0.68 ***	1				
5 PEU	0.58 ***	0.67 ***	0.67 ***	0.71 ***	0.73 ***	1			
7 PU	0.63 ***	0.65 ***	0.58 ***	0.63 ***	0.79 ***	0.77 ***	1		

Table 3. *Cont.*

Constructs	1	2	3	4	5	6	7	8	9
8 ATT	0.70 ***	0.68 ***	0.56 ***	0.67 ***	0.79 ***	0.74 ***	0.82 ***	1	
9 BI	0.62 ***	0.60 ***	0.55 ***	0.66 ***	0.70 ***	0.63 ***	0.67 ***	0.78 ***	1

Note: *** $p < 0.001$; SN, subjective norms for online teaching; FC, facilitating condition; TTSE, teachers' technology self-efficacy; RD, readiness; PEU, perceived ease of use; PU, perceived usefulness; ATT, attitude toward online teaching; BI, behavioral intention for online teaching.

4.3. Hierarchical Multiple Regression Analysis

This study used hierarchical multiple linear regression to examine the effects of individual experience, environmental support, self-perception, and technology acceptance on the outcome variables attitude toward online teaching and behavioral intention. The predictive effect of the four levels of variables on the outcome variable attitude toward online teaching is shown in Table 4. The predictive capability of the final model was 78.3%, and all four levels of variables had statistically significant predictive effects on attitude toward online teaching, but differences lie in the predictive capability. The strongest predictive capability among all the variables was perceived usefulness ($\beta = 0.419$, $p < 0.001$), followed by belief ($\beta = 0.212$, $p < 0.001$) and subjective norms ($\beta = 0.206$, $p < 0.001$). Note that the teachers' technology self-efficacy had a significant negative impact ($\beta = -0.108$, $p < 0.001$). Interestingly, block 1 individual experience can explain 1.7% of the variance, while neither previous online teaching experience nor online teaching load can significantly predict attitude toward online teaching. The predictive effect of the four levels of variables on the outcome variable behavioral intention is shown in Table 5. The final model exhibited a predictive capability of 60.4%, and the four levels of variables had statistically significant predictive effects on the behavioral intention to teach online. The strongest predictive capability for the outcome variable of behavioral intention was readiness ($\beta = 0.365$, $p < 0.001$), followed by perceived usefulness, belief, and subjective norms ($\beta = 0.221$, $p < 0.001$; $\beta = 0.219$, $p < 0.001$; $\beta = 0.153$, $p < 0.001$). Compared with online teaching attitude, online teaching load had a statistically significant impact on behavioral intention, although the effect size was relatively small ($\beta = 0.067$, $p < 0.001$).

Table 4. Hierarchical multiple regression analysis summary predicting teachers' attitude toward online teaching.

Variable	R^2	ΔR^2	ΔF	B	SE	β
Block 1 Individual experience	0.017	0.017	9.422 ***			
POTE				−0.017	0.008	−0.031
OTL				0.013	0.007	0.025
Block 2 Environmental support	0.539	0.522	621.971 ***			
SN				0.200	0.019	0.206 ***
FC				0.060	0.028	0.049 *
Block 3 Self-perception	0.725	0.186	246.029 ***			
TTSE				−0.129	0.026	−0.108 ***
RD				0.212	0.028	0.184 ***
Belief				0.212	0.028	0.212 ***
Block 4 Technology acceptance	0.783	0.058	145.486 ***			
PEU				0.044	0.029	0.041
PU				0.400	0.026	0.419 ***

Note: * $p < 0.05$, *** $p < 0.001$; SE: Standard Error. POTE, previous online teaching experience; OTL, online teaching load; SN, subjective norms for online teaching; FC, facilitating condition; TTSE, teachers' technology self-efficacy; RD, readiness; PEU, perceived ease of use; PU, perceived usefulness.

Table 5. Hierarchical multiple regression analysis summary predicting teachers' behavior intuition for online teaching.

Variable	R^2	ΔR^2	ΔF	B	SE	β
Block 1 Individual experience	0.019	0.019	10.454 ***			
POTE				−0.012	0.009	−0.025
OTL				0.029	0.008	0.067 ***
Block 2 Environmental support	0.411	0.392	365.864 ***			
SN				0.131	0.023	0.153 ***
FC				0.048	0.033	0.045
Block 3 Self-perception	0.591	0.180	160.357 ***			
TTSE				−0.001	0.030	−0.001
RD				0.370	0.033	0.365 ***
Belief				0.193	0.033	0.219 ***
Block 4 Technology acceptance	0.604	0.013	17.847 ***			
PEU				−0.091	0.035	−0.096 *
PU				0.186	0.031	0.221 ***

Note: * $p < 0.05$, *** $p < 0.001$; SE: Standard Error. POTE, previous online teaching experience; OTL, online teaching load; SN, subjective norms for online teaching; FC, facilitating condition; TTSE, teachers' technology self-efficacy; RD, readiness; PEU, perceived ease of use; PU, perceived usefulness.

5. Discussion

Among the variables of environmental support, subjective norms emerged as a key variable with significant predictive power over the teachers' attitude toward online teaching and behavioral intention for online teaching. This finding aligns with previous research conducted by Crawley [69], which demonstrated the influential role of subjective norms in shaping science teachers' intention to adopt research-based teaching methods. Moreover, recent studies conducted by Hou et al. [70] have further emphasized the promotional effect of subjective norms on pre-service teachers' attitude toward the utilization of technology-enabled learning. Subjective norms reflect the social acceptance and recognition of online teaching, indicating society's attitude and perceptions toward online teaching [71], which, in turn, further affect teachers' attitude toward online teaching and behavioral intention for online teaching. By understanding the significance of subjective norms, educators and policymakers can develop strategies to enhance the social support and acceptance of online teaching, ultimately fostering a positive and conducive environment for its implementation.

Both readiness and self-perceived belief significantly predicted teachers' online teaching attitude and behavioral intention, consistent with previous studies [72]. This is because when teachers are thoroughly prepared for online instruction, they are more likely to recognize the value of online teaching [73], leading to a favorable attitude and a greater willingness to implement it. Additionally, teachers with strong self-belief are more likely to overcome various challenges and respond positively to online teaching difficulties, serving as role models for students and driving the sustainable development of online education. Perceived usefulness could also predict the teachers' attitude toward online teaching and behavioral intention positively, aligning with the previous research findings. For instance, Teo et al. [71] found that perceived usefulness exerted a significant positive influence on the attitude of pre-service teachers toward computers. Similarly, Kim et al. [74] found that perceived usefulness had a direct impact on attitude, whereas perceived ease of use did not. Other researchers have delved into the impact of perceived usefulness on attitude, and several studies have also examined its influence on behavior intention. For instance, Rafique et al. [75] highlighted, in their study, that perceived usefulness was a significant factor in technology usage intention, also highlighting the predictive effect of perceived ease of use on usage intention.

However, in this study, perceived ease of use had only a slightly significant negative predictive effect on behavioral intention and no significant impact on the teachers' attitude toward online teaching. One possible explanation is that teachers believe technology can enhance teaching effectiveness and efficiency, leading to a greater willingness to embrace and adapt to a new approach. As current online teaching platforms are generally user-

friendly, teachers prioritize effectiveness over ease of use, which explains the limited impact of perceived ease of use on the teachers' attitude toward online teaching and behavioral intention, as compared to the influence of perceived usefulness. Nowadays, the decision to continuously engaging in online teaching is not merely influenced by the user-friendliness of online platforms, but rather, is likely to be shaped by the teacher's judgment of the value that technology can generate [76].

Contrary to the existing research [77], the present study revealed that previous online teaching experience did not significantly impact the teachers' online teaching attitude and behavioral intention. However, at the level of self-perception, belief exerted a significant positive effect on the teachers' attitude and behavioral intention for online teaching. It is reasonable to speculate that previous online teaching experience may not directly impact teachers' attitude and behavioral intention to teach online, but rather exert influence indirectly through the changing cognition and belief shaped by past experiences [78].

As noted in the literature review, attitude can be manifested to some extent through behavior, but there is no necessary connection between the two. Therefore, it is not surprising that the impact of several variables on the teachers' online teaching attitude and behavioral intention varies. In this study, the online teaching load could positively predict the teachers' behavioral intention to teach online, but could not significantly predict the teachers' attitude toward online teaching. We posit that the explanation for this disparity lies in the potentially heavy weekly workload of teachers, which may negatively impact their emotional attitude and opinion toward online teaching [79]. However, teachers can also accumulate practical experience through weekly online teaching activities. With the accumulation of experience, teachers' understanding and mastery of online teaching continue to improve, which enables them to carry out online teaching more confidently and proficiently [80], thereby enhancing their online teaching behavior tendencies.

Moreover, we observed a negative impact of the teachers' technology self-efficacy on the teachers' attitude toward online teaching, while its impact on behavioral intention was not significant. Although teachers' increased technology self-efficacy generally indicates a higher level of technological expertise and confidence among teachers [81,82], teachers' excessive technology self-efficacy may also cause them to develop unrealistically high expectations for online teaching and teaching effectiveness [83]. Teachers may perceive that current online teaching does not fully leverage the advantages of technology, leading to a mismatch between the expectations and actual outcomes, thereby generating negative emotions like disappointment during the teaching process. These factors may lead teachers to have a negative attitude toward online teaching. In the post-pandemic era, where online education is no longer emergency alternative, but rather an emerging instructional norm, it is crucial to strike a balance between cultivating technical proficiency and managing teachers' expectations.

6. Conclusions

This study examined college teachers' attitude toward online teaching and behavioral intention for online teaching following the completion of the spring semester in 2020. Hierarchical multiple-linear regression was utilized to explore the predictive capacity of various influencing factors on the teachers' attitude toward online teaching and behavioral intention for online teaching at the following four different levels: individual experience, environmental support, self-perception, and technology acceptance. The aim was to find the key determinants that impact the sustainable development of online teaching for college teachers, with the goal of promoting its long-term growth. The findings show that certain variables, such as subjective norms, readiness, belief, and perceived usefulness, significantly predicted teachers' attitude toward online teaching and behavioral intention for online teaching. However, some variables influenced only one aspect, while others, such as previous online teaching experience, had no impact on either outcome variable. Overall, environmental support emerged as the most influential factor, followed by self-perception.

However, the impact of individual experience and technology acceptance appeared to be relatively limited.

We believe this study makes two unique contributions to the literature of online teaching. First, it proposed a four-level analytical framework (i.e., individual experience, environmental support, self-perception, and technology acceptance) that systematically covers various factors that possibly affect college teachers' attitude and behavioral intention toward online teaching, fully considering the impact of internal factors (such as individual experience) and external factors (such as environmental support). This classification enables us to better understand the complex and interwoven nature of the factors influencing online teaching. Second, this study distinguished between college teachers' attitude and behavioral intention toward online teaching, comparing the significant predictors of the two constructs. This discrimination offers deeper insights into the motivations and decision-making processes underlying teachers' online teaching behavior, providing directions for future research on the sustainable development of online education.

6.1. Implications

Based on the research results, the following implications are proposed. For developers of online teaching platforms, it is important to pay more attention to the effectiveness of platform applications, rather than just the ease of use of the platform during development. For schools, it is important to provide teachers with ample technical support and emotional recognition owing to the challenges they face in online teaching. The provision of necessary resources and encouragement from the environment greatly contribute to the successful implementation of online teaching. For college teachers engaged in online teaching, first, they need to enhance their understanding of the value and significance of online teaching, and second, thorough preparation before each online teaching session is essential for ensuring seamless execution.

6.2. Limitations and Future Research

It is important to note several limitations of our study when interpreting the research results. First, the questionnaire measurement tool we used still has its limitations, and we have not yet found an effective way to ensure the accuracy of the teachers' responses. Second, because our research mainly relied on quantitative data for statistical analysis, it lacked an exploration of qualitative factors that affect teachers' attitude toward online teaching and behavioral intention for online teaching. Additionally, this study only conducted one test, so it could not fully reveal the long-term effects of online teaching and the continuous development of teachers. Therefore, we suggest that future research should adopt more interments. In addition to quantitative data, qualitative data-collection methods such as interviews can also be combined to conduct a more comprehensive analysis of quantitative and qualitative data. Moreover, future research should continuously track teachers' online teaching practice and deeply explore the dynamic factors of teachers' attitude toward online teaching and behavioral intention for online teaching to provide more targeted suggestions for the development of online teaching.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study. All participants were fully informed if anonymity would be assured, why the research was being conducted, how their data would be used.

Data Availability Statement: The data presented in this study are openly available from Mendeley Data at https://www.doi.org/10.17632/p6cvdv425b.1 (accessed on 31 January 2024).

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Appendix A

Online Teaching Experience (OTE) Questionnaire

Introduction: Greetings! We would like to invite you to participate in our survey on college teachers' online teaching experiences during the 2020 Spring Semester. Please answer the following survey questions truthfully based on your online teaching experience. The information we collect from this survey will be used for research purpose only, and any personally identifiable information will be removed from all publications and presentations. Your participation in the survey is voluntary. Thank you for your participation!

The First Section: Basic Information

1. Your gender is ___

   A. Male B. Female

2. Your age is ___
3. Before the pandemic, whether you have ever conducted online teaching ___

   A. Never B. Occasionally C. Sometimes D. Often D. Usually

4. During the pandemic, where did you teach at home? ___

   A. Provincial capital or municipality directly under the central government B. Prefecture-level city C. County seat D. Township E. Village

5. Your education background is___

   A. Bachelor's degree or below B. Master's degree C. Doctoral degree and above

6. Your professional title is ___

   A. Assistant B. Lecturer C. Associate professor D. Professor E. Other academic titles

7. During the pandemic, how many hours do you average to invest in teaching activities (including lesson preparation and teaching) each week? ___

   A. Less than 1 h B. 1–3 h C. 4–6 h D. 7–9 h E. 10–12 h F. More than 12 h

The Second Section: Online-Teaching Experience (Five-Point Likert Scale)

1. Perceived Subjective Norms for Online Teaching (SN, three items)
   (1) The effectiveness of the online-teaching form is generally recognized by colleagues around me.
   (2) I hope that online teaching will become increasingly important in university classes.
   (3) The school (college) leadership believes that I should be proficient in online teaching.
2. Teacher Technology Self-Efficacy (TTSE, seven items)
   (1) I know how to solve technical problems I encounter.
   (2) Learning new technologies is a relatively simple task for me.
   (3) I keep up with emerging frontier technologies.
   (4) I often explore and use various technologies.

(5) I have some understanding of many different technologies.
(6) I have basic information literacy in the rational use of technology.
(7) I have many opportunities to use different technologies in my work.

3. Facilitating Condition (FC, seven items)
   (1) The parents of students generally support online teaching.
   (2) The education department and schools support teachers in carrying out online teaching.
   (3) Our school has a relatively complete online-teaching guidance plan or training program to help teachers deliver online courses.
   (4) During the preparation and implementation of online teaching, my questions can always get timely feedback from relevant departments.
   (5) The online-teaching platform I use is in good condition (with well-developed hardware facilities, smooth internet speed, and normal software operation).
   (6) I can obtain necessary technical tools and digital learning resources for online teaching.
   (7) My students have basic technical tools and network conditions for online learning.
4. Perceived Ease of Use (PEU, six items)
   (1) I think the technology and operations required for online teaching are easy to learn.
   (2) I believe it is easy to control the progress and direction of online teaching.
   (3) The interaction between me and students in online teaching is clear and understandable.
   (4) The interaction between me and students in online teaching is very flexible.
   (5) It is easy for me to master the online teaching skills.
   (6) Overall, I find online teaching easy to carry out.
5. Perceived Usefulness (PU, five items)
   (1) By conducting online teaching, I can improve my teaching performance.
   (2) By conducting online teaching, I can increase my research output.
   (3) Online teaching can enhance my teaching efficiency.
   (4) Online-teaching platforms and digital teaching resources make it easier for me to carry out teaching work.
   (5) Overall, I feel that online teaching facilitates the smooth conduct of teaching work.
6. Attitude Toward Online Teaching (ATT, eight items)
   (1) I believe that online teaching is very valuable.
   (2) I think online teaching is very intelligent.
   (3) I consider online teaching to be very useful.
   (4) I believe that online teaching is beneficial for teaching.
   (5) I like carrying out online teaching.
   (6) I have a positive attitude toward online teaching.
   (7) When conducting online teaching, I feel very delighted.
   (8) Overall, I feel that online teaching is a good teaching method.
7. BI for Online Teaching (BI, five items)
   (1) I plan to use online teaching to enrich my teaching mode.
   (2) I plan to use digital learning resources to support my teaching process.
   (3) I plan to use online-teaching platforms to guide students' independent learning.
   (4) I plan to use online-teaching platforms or tools to assist in teaching evaluation and management.
   (5) I plan to make online-teaching platforms a regular teaching mode.

8. Readiness for Online Teaching (RD, four items)
   (1) In the online-teaching process, I can effectively integrate technology with the curriculum.
   (2) In the process of online teaching, I can select appropriate technological means according to the learning objectives of the course.
   (3) I have received sufficient training to integrate technology into my online teaching.
   (4) My computer skills are sufficient to support online teaching.
9. Belief in Online Teaching (eight items)
   (1) When I conduct online teaching, my teaching becomes more student-centered.
   (2) I habitually integrate online teaching into my in-class teaching.
   (3) The efforts I have made for online teaching have actively changed students' learning behaviors in the classroom.
   (4) The implementation of online teaching has made my in-class teaching more interactive.
   (5) Online teaching has enhanced students' interactions and/or collaborations.
   (6) Online teaching has had a positive impact on students' learning and achievements.
   (7) During online teaching, most students are proficient in using computers for common operations.
   (8) Online teaching has improved the quality of student assignments.

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