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# Online teaching efficacy and its determinants among Chinese college teachers during the COVID-19 pandemic online teaching

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To minimize the impact of the COVID-19 pandemic on education, countries around the world have turned to online teaching and learning. However, this sudden change also challenges teachers' teaching competence and efficacy. This study investigated online teaching efficacy and its determinants among Chinese college teachers during the COVID-19 pandemic online teaching. Two hundred and seventeen Chinese college teachers who engaged in online teaching during the pandemic participated in an online survey focusing on online teaching efficacy. The results showed that the overall online teaching efficacy of college teachers was relatively high. While demographics such as gender, age, teaching experience, academic title, highest degree attained, and area of expertise did not significantly impact online teaching efficacy, relevant experiences in online teaching - such as prior online course instruction, participation in online teaching training programs or seminars, and collaborative discussions with colleagues - were found to enhance online teaching efficacy. Universities should quickly adapt to this change and build a professional development support system for faculty in online teaching.

## KEYWORDS

online teaching, teaching efficacy, college teachers, COVID-19, China

## Introduction

In early 2020, the outbreak of the COVID-19 pandemic and its rapid spread across the globe had a significant impact on people's lives, including education (Tarkar, 2020; Ntsiful et al., 2023). To ensure the safety of teachers and students and to minimize disruptions to education, most educational institutions worldwide were being forced to move from offline to online as a matter of urgency. In China, the Ministry of Education in China implemented the policy of "Suspending Classes Without Stopping Learning" (Ministry of Education of China, 2020), and schools nationwide transitioned to online teaching. According to the "45th China Statistical Report on Internet Development," by March 2020, there were 423 million online education users in China, including 265 million primary, secondary, and college students who took online courses (China Internet Network Information Center, 2020).

Although online teaching provided an excellent alternative to normalizing teaching during the pandemic (Aslam et al., 2023), lack of resources, technical support, pedagogical training, and experience in online teaching will also pose serious challenges to online teaching and learning (UNESCO, 2020; World Bank, 2020). In addition, compared to traditional offline

teaching, online teaching has significantly changed teaching methods, technology use, student engagement, classroom management, teacher skills, and psychological distance (Berge, 1998; Perreault et al., 2002; Shea, 2007). While previous studies have underscored the close relationship between teaching efficacy and teaching effectiveness in traditional face-to-face settings (Tschannen-Moran et al., 1998; Klassen et al., 2011), there remains a noticeable gap in the literature concerning the exploration of teaching efficacy within the context of online instruction. Therefore, the current study sought to empirically examine the online teaching efficacy of college educators and the various factors that influence this efficacy, drawing upon insights gleaned from the online teaching landscape amidst the COVID-19 outbreak in China.

The notion of efficacy emanates from the social learning theory elucidated by Bandura. In his seminal work in 1977, Bandura delineated two pivotal concepts: Efficacy Expectancy and Outcome Expectancy. Efficacy expectancy pertains to an individual's confidence in their capacity to accomplish a specific goal; whereas outcome expectancy denotes an individual's anticipation that an event will culminate in a particular result. By differentiating between these categories of expectations, Bandura posits that lacking a sense of efficacy, notwithstanding positive outcome expectations, may lead an individual to eschew or abandon a given task. Conversely, a positive sense of efficacy will bolster perseverance, even when faced with potentially adverse outcome expectations. Furthermore, empirical research has demonstrated that self-efficacy forecasts success beyond one's professional competencies (Schunk, 1984; Stajkovic and Luthans, 1998).

Teaching efficacy refers to teachers' confidence and belief in their ability to teach. Teachers' teaching efficacy has been found to be closely related not only to teachers' teaching performance, but also to students' academic achievement, motivation, and learning efficacy (Trentham et al., 1985; Saklofske et al., 1988; Stajkovic and Luthans, 1998). Tschannen-Moran et al. (1998) proposed a cyclical model to describe teaching efficacy. In this model, there are four elements that affect self-efficacy: successful experience for self, successful experience for others, verbal persuasion, and physiological arousal, the most important of which is successful experience for self. In addition, the teaching efficacy has a cyclical nature. When faced with a specific teaching task, an individual will first assess his or her strengths and weaknesses based on information from each element and then analyze his or her competence based on the task requirements and relevant supporting conditions to develop a sense of teaching efficacy. On the one hand, teaching efficacy affects teachers' motivation, commitment, and ultimately effectiveness in performing a given teaching task; on the other hand, teaching effectiveness as a result of previous experience would further affect the subsequent teaching efficacy. Therefore, the study of teaching efficacy and its influencing factors is important for both teachers and students.

In past decades, numerous studies have examined the factors that influence teachers' teaching efficacy in traditional offline teaching settings. For example, Mehdinezhad (2012) found that teaching experience, title, and teachers' teaching efficacy were correlated. Teaching efficacy is significantly higher among teachers with 20 or more years of teaching experience as compared to teachers with less than 20 years of teaching experience. Assistant professors have a higher sense of efficacy in creating an effective learning environment compared to professors and associate professors. However, gender was

not related to teaching efficacy. Chang et al. (2011) also found that teaching experience was the most critical factor related to college teachers' teaching efficacy. Teaching efficacy was significantly higher among teachers with 6 years of teaching experience and above as compared to those with less than 6 years of teaching experience. In addition, the study also found that male teachers had significantly higher efficacy in classroom management and learning assessment than female teachers.

However, most existing studies on college teachers' teaching efficacy were based on offline teaching situations. Compared to traditional face-to-face offline teaching, online teaching faces a different set of challenges, especially during the pandemic without being thoroughly prepared, teachers may have to play different roles in pedagogical approach, social perception, classroom management, and use of technology (Berge, 1998). Firstly, due to most of the teaching theories, practices, and training courses the teacher received being based on offline teaching situations, most teachers may lack the appropriate knowledge and skills for online teaching. For example, recent studies indicate that although most teachers are proficient in the use of computers in the teaching setting, the ability to effectively integrate technological teaching tools into pedagogical practices in the online classroom is still inadequate (Almaiah and Alamri, 2018; Akram et al., 2021). Second, because online teaching absence the direct involvement in offline classrooms, the lack of teaching presence would affect the teachers' social emotions perception. For example, a recent study revealed that one of the major challenges university faculty members face with online teaching practices is class management (Akram et al., 2021). Another study shows that teachers are more likely to experience burnout in online teaching due to social isolation and depersonalization characteristics as compared to traditional offline teaching (Hogan and McKnight, 2007). In addition, the lack of offline contact may pose serious challenges in teachers' monitoring and management of students, and college students enrolled in online teaching and learning are perceived negatively during COVID-19 (van der Walt and Nkoyi, 2022).

Based on Bandura's social learning theory, researchers have developed a series of questionnaires to measure teachers' teaching efficacy from different perspectives, the most widely used is the Teaching Efficacy Questionnaire developed by Tschannen-Moran and Hoy (2001). This questionnaire consists of 24 items for three factors (student engagement efficacy, teaching strategy efficacy, and classroom management efficacy). Robinia and Anderson (2010) revised the Teaching Efficacy Questionnaire to measure online teaching efficacy. In addition to the original 24 items developed by Tschannen-Moran and Hoy (2001), eight new items were added to measure teachers' confidence in using equipment and technology and using online teaching strategies. Based on the factor analysis, Robinia and Anderson identified four factors (student engagement efficacy, online teaching strategy efficacy, online classroom management efficacy, and efficacy in computer skills) in the Online Teaching Efficacy Questionnaire. The internal consistency coefficient for all four factors was above 0.86, and the internal consistency coefficient for the full questionnaire was 0.93.

Using the Online Teaching Efficacy Questionnaire, Robinia and Anderson (2010) examined the teaching efficacy of 140 nurse faculty in higher education institutions and found that neither gender, age, or years of teaching experience had an impact on online teaching efficacy. Based on another study of 91 college teachers who had engaged in

online teaching from 2005 to 2009, Horvitz et al. (2015) showed that women outperformed men in their efficacy use of online teaching strategies. Both two studies revealed that online teaching experience had a positive prediction for online teaching efficacy. With the popularity of the Internet and the rapid development of information technology, online teaching and learning become an important trend in contemporary education, and it provide an important supplement to offline teaching and learning. The outbreak of the COVID-19 pandemic has pushed online teaching into the center of the stage of educational history. With the sudden transition into online teaching during the pandemic, the lack of teaching efficacy will become an important factor affecting the quality of online teaching. However, few studies examine online teaching efficacy and its determinants, and few existing studies focus on the Western sample.

The current study examined college teachers' online teaching efficacy and its influencing factors during the COVID-19 pandemic online teaching. Specifically, two questions were examined: (1) What is the status of college faculty's online teaching efficacy, including student engagement efficacy, online teaching strategy efficacy, online classroom management efficacy, and efficacy in computer skills during the COVID-19 pandemic online teaching? (2) How do various demographic variables (including gender, age, years of teaching experience, title, highest degree, and major) and online teaching experience (including having any online teaching experience before, taking in online teaching training courses and seminars, and discussing with colleagues) work on college faculty's online teaching efficacy.

## Materials and methods

### Sample

A quantitative cross-sectional survey study was conducted to examine the online teaching efficacy and its determinants among Chinese college teachers during the COVID-19 pandemic online teaching. From April 23–27, 2020, 217 college teachers from 44 universities in China who participated in online teaching completed an online survey via Wenjuanxing (an online survey platform) anonymously. A snowball sampling technique with different social media resources (e.g., WeChat, QQ, and Weibo) was used to post and disseminate the questionnaires. Table 1 presents the characteristics of the sample in the present study. The age range of the sample was 24–58 years old with a mean age of 36.41 ± 7.28 years. The range of teaching experience was 1–37 years with a mean of 9.15 ± 8.20 years. Informed consent was obtained from all participants at the beginning of the questionnaire, and ethical approval was granted from the local institutional board. Since this study focuses primarily on the online efficacy of university teachers, the sample of this study only includes college teachers.

### Measurement

The online teaching efficacy in the present study was measured with the Online Teaching Efficacy Questionnaire modified by Robinia and Anderson (2010). This questionnaire consists of 32 questions that measure online teaching efficacy in four dimensions: student

TABLE 1 The characteristics of the sample in the present study.

Variable		n	%
Sex	Female	128	58.99%
	Male	89	41.01%
Age (year)	30 years and below	48	22.1%
	31–40 years	121	55.8%
	41–50 years	34	15.7%
	51–60 years	14	6.5%
Length of teaching experience(year)	2 years and below	47	21.7%
	2–5 years	50	23.0%
	5–10 years	49	22.6%
	10–20 years	50	23.0%
	20 years and above	21	9.7%
Title	Assistant	57	26.3%
	Lecturer	85	39.2%
	Associate professor	52	24.0%
	Professor	23	10.6%
Degree	Bachelor	36	16.6%
	Master	111	51.2%
	Doctor	70	32.3%
Major	Humanities and Social Sciences	126	58.1%
	STEM	91	41.9%
Have any online teaching before	Yes	50	23.0%
	No	167	77.0%
Took training courses or seminar	Yes	118	54.4%
	No	99	45.6%
Discussed with colleague	Yes	177	81.6%
	No	40	18.4%

engagement, use of online teaching strategies, online classroom management, and use of computers, with 8 items in each dimension (see Appendix). All items were rated on a nine-point Likert scale (1 = Nothing could be done, 9 = Done very well) followed by the previous studies (Robinia and Anderson, 2010; Horvitz et al., 2015). The mean scores of 8 items on each dimension were the scores of the levels of perceived online teaching efficacy in certain dimensions. The sum score of the scores in four dimensions was the score of the full questionnaire. Due to the original questionnaire being an English version, we translated it into Chinese and invited two colleagues (professors in psychology) to verify the translated version before administering the test. The internal consistency reliability coefficients (Cronbach's  $\alpha$ ) for the four dimensions (student engagement: 0.93, online teaching strategies: 0.93, online classroom management: 0.91, and computer skills: 0.94) and the full questionnaire (0.98) were all above 0.90 for the present sample. The confirmatory factor analysis also showed that the 4 factors model fitted quite well:  $\chi^2/df=3.05$ , TLI=0.853, CFI=0.841, RMSEA=0.091, SRMR=0.058, factor loadings in each factor ranged between 0.66 and 0.83, showed that the questionnaire has good reliability and validity.

Meanwhile, various demographic variables were also collected, including gender, age, lengths of teaching experience, title, highest degree, and major field (see Table 1), as well as their various online teaching experiences. Online teaching experience was measured with 3 self-adapted questions: (1) “Have you had any experience in online teaching before this semester?”; (2) “Have you ever attended a training course or seminar that addressed the skills, techniques, issues, and instructional design of an online course?”; and (3) “Do you regularly discuss or exchange skills, techniques, questions, and instructional design with colleagues during online teaching?” Moreover, two questions were also designed to assess teachers’ attitudes toward taking training courses and exchanging ideas with colleagues: (1) “To what extent do you think such training sessions or workshops are necessary for the success of your online course?” and (2) “To what extent do you think that discussions with colleagues are necessary to improve competence in online teaching?” These two questions were asked to respond on a five-point Likert scale from 1 (not at all necessary) to 5 (very necessary).

## Data analysis

We used the statistical analysis software package SPSS 23.0 to analyze the data of the present study. First, descriptive analyses, including means, *SD*, and frequency, were computed to describe the characteristics of the sample and the status of online teaching efficacy during the COVID-19 online teaching. Second, multivariate analyses of variance (MANOVAs) were conducted to examine group differences in online teaching efficacy in various sample characteristics and online teaching experiences.

## Results

### The status of online teaching efficacy

Table 2 presents the participants’ overall online teaching efficacy as well as the status of efficacy on the four specific dimensions. Overall, the online teaching efficacy was relatively high, the scores in four dimensions were all higher than the median scores (5) on scales. Across the four dimensions, participants had the highest efficacy in computer skills, followed by efficacy in online teaching strategies and classroom management, with the lowest efficacy in student engagement. The result of multivariate analyses (MANOVAs) showed that the scores in four dimensions were significantly different from each other,  $F(3,648) = 108.26$ ,  $p < 0.001$ ,  $\eta^2 = 0.33$ .

TABLE 2 The status of online teaching efficacy.

	Mean	SD	Range
Student engagement	5.70	1.44	1.00–9.00
Online teaching strategies	6.32	1.31	1.75–9.00
Online classroom management	6.02	1.37	1.75–9.00
Computer skills	6.56	1.30	1.00–9.00
Sum score	24.59	5.11	5.50–36.00

### Online teaching efficacy across various demographic factors

Table 3 presents the means, standard deviations, and statistical value of *F*-test tests across groups in various demographic variables on online teaching efficacy. To examine the effects of various demographics on online teaching efficacy, a series of multivariate ANOVAs were conducted with the sum scores and factors scores as the dependent variable, and various demographic variables as the independent variable. As shown in Table 3, results showed that the effects of sex [*Wilks’ Lambda* = 0.99,  $F(4,212) = 0.52$ ,  $p = 0.720$ ,  $\eta^2 = 0.01$ ], age [*Wilks’ Lambda* = 0.92,  $F(12,636) = 1.55$ ,  $p = 0.101$ ,  $\eta^2 = 0.03$ ], lengths of teaching [*Wilks’ Lambda* = 0.93,  $F(16,848) = 1.04$ ,  $p = 0.416$ ,  $\eta^2 = 0.02$ ], title [*Wilks’ Lambda* = 0.94,  $F(12,636) = 1.13$ ,  $p = 0.333$ ,  $\eta^2 = 0.01$ ], highest degree [*Wilks’ Lambda* = 0.98,  $F(8,424) = 0.56$ ,  $p = 0.806$ ,  $\eta^2 = 0.01$ ], and major field [*Wilks’ Lambda* = 0.97,  $F(8,424) = 1.48$ ,  $p = 0.207$ ,  $\eta^2 = 0.03$ ] on online teaching efficacy were all not significant.

### Online teaching efficacy across various online teaching experiences

Table 4 presents the means, standard deviations, and statistical value of *F*-test tests across groups in different online teaching experiences on online teaching efficacy. To examine the effects of various online teaching experiences on online teaching efficacy, a series of multivariate ANOVAs were conducted with the sum scores and factors scores as the dependent variable, and various online teaching experiences as the independent variable. As shown in Table 4, results showed that the effects of having any online teaching before [*Wilks’ Lambda* = 0.91,  $F(4,212) = 4.97$ ,  $p < 0.001$ ,  $\eta^2 = 0.08$ ], taking online teaching training courses or seminar [*Wilks’ Lambda* = 0.90,  $F(4,212) = 5.92$ ,  $p < 0.001$ ,  $\eta^2 = 0.10$ ], and discussed with colleague [*Wilks’ Lambda* = 0.93,  $F(4,212) = 3.74$ ,  $p < 0.01$ ,  $\eta^2 = 0.07$ ] on online teaching efficacy were all significant.

Further univariate analyses of variance revealed that teachers who had online teaching experience before showed significantly higher online teaching efficacy than those not had any online teaching before both on the sum score and factors scores ( $ps < 0.001$ ). Likewise, teachers who had taken online teaching training courses or seminars showed significantly higher online teaching efficacy than those who did not take both on the sum score and factors scores ( $ps < 0.05$ ). In addition, as compared to the teachers who did not discuss or exchange online teaching experience with their colleagues, teachers who had discussed or exchanged online teaching experience with their colleagues, showed significantly higher online teaching efficacy in online teaching strategies and computer skills ( $ps < 0.001$ ).

## Discussion

The present study examined college teachers’ online teaching efficacy and its influencing factors during the COVID-19 pandemic online teaching in China. The results showed that the overall online

TABLE 3 Online teaching efficacy across various demographic factors.

	Groups	Student engagement	Teaching strategies	Classroom management	Computer skills	Sum score	F	p
		M(SD)	M(SD)	M(SD)	M(SD)	M(SD)		
Sex	Male	5.61(1.64)	6.19(1.49)	5.93(1.47)	6.48(1.51)	24.22(5.88)	0.52	0.720
	Female	5.76(1.27)	6.40(1.15)	6.07(1.28)	6.60(1.14)	24.84(4.50)		
Age (years)	30 and below	5.63(1.04)	6.12(1.05)	5.95(1.04)	6.44(1.12)	24.16(3.97)	1.55	0.101
	31–40	5.63(1.50)	6.29(1.38)	6.00(1.42)	6.51(1.38)	24.46(5.42)		
	41–50	5.82(1.55)	6.58(1.28)	6.11(1.52)	6.76(1.29)	25.28(5.22)		
	51–60	6.18(1.79)	6.58(1.41)	6.03(1.56)	6.74(1.25)	25.54(5.69)		
Lengths of teaching experience	2 and below	5.85(1.06)	6.34(1.07)	6.18(1.15)	6.57(1.10)	24.96(4.19)	1.04	0.416
	2–5	5.57(1.17)	6.28(1.34)	5.96(1.08)	6.50(1.24)	24.33(4.29)		
	5–10	5.71(1.56)	6.20(1.48)	5.92(1.16)	6.47(1.45)	24.32(5.89)		
	10–20	5.54(1.80)	6.38(1.54)	5.98(1.57)	6.60(1.43)	24.51(6.01)		
	20 and above	6.00(1.52)	6.46(1.19)	6.02(1.35)	6.70(1.28)	25.20(4.81)		
Title	Assistant	6.01(1.20)	6.51(1.19)	6.33(1.19)	6.68(1.24)	25.55(4.64)	1.13	0.333
	Lecturer	5.56(1.35)	6.20(1.19)	5.91(1.36)	6.56(1.13)	24.24(4.73)		
	Associate professor	5.54(1.75)	6.26(1.59)	5.85(1.56)	6.39(1.61)	24.06(6.17)		
	Professor	5.79(1.44)	6.39(1.30)	5.94(1.22)	6.56(1.32)	24.69(4.91)		
Degree	Bachelor	5.92(1.45)	6.50(1.28)	6.20(1.33)	6.66(1.31)	25.29(5.14)	0.56	0.806
	Master	5.70(1.35)	6.30(1.18)	6.03(1.35)	6.60(1.15)	24.64(4.68)		
	Doctor	5.58(1.57)	6.25(1.49)	5.89(1.42)	6.41(1.51)	24.14(5.73)		
Major/Field	Humanities and Social Sciences	5.69(1.47)	6.25(1.32)	6.02(1.41)	6.47(1.38)	24.44(5.32)	1.48	0.207
	STEM	5.71(1.39)	6.41(1.28)	6.01(1.31)	6.67(1.18)	24.80(4.82)		

TABLE 4 Online teaching efficacy across different online teaching experiences.

	Group	N	Student engagement	Teaching strategies	Classroom management	Computer skills	Sum score	F	p
			M(SD)	M(SD)	M(SD)	M(SD)	M(SD)		
Have any online teaching before	Yes	50	6.41(1.40)	6.99(1.12)	6.66(1.28)	7.21(1.15)	27.27(4.71)	4.97	0.001
	No	167	5.49(1.38)	6.11(1.29)	5.82(1.33)	6.36(1.28)	23.79(4.96)		
Took training courses or seminar	Yes	118	5.92(1.34)	6.48(1.20)	6.21(1.26)	6.86(1.11)	25.49(4.58)	5.92	0.001
	No	99	5.43(1.50)	6.12(1.40)	5.77(1.45)	6.18(1.42)	23.51(5.50)		
Discussed with colleague	Yes	177	5.77(1.30)	6.42(1.15)	6.07(1.24)	6.68(1.11)	24.96(4.46)	3.74	0.006
	No	40	5.36(1.91)	5.87(1.78)	5.73(1.79)	5.96(1.86)	22.94(7.15)		

teaching efficacy was relatively high for college teachers. Although various demographic factors did not affect online teaching efficacy, any relevant online teaching experience would contribute to the online teaching efficacy.

Although the finding of the present study showed that the overall online teaching efficacy was relatively high, there are some differences across different dimensions of online teaching efficacy, with the highest in computer skills, followed by the online teaching strategies and classroom management, and the lowest in student engagement. These findings suggested that with the popularity of the Internet and computers in modern society, and the massive use of multimedia teaching in recent years in universities, most teachers are proficient in the operation and use of computers (Saubern et al., 2020), thus showing high efficacy in computer skills. However, due to the spatial

isolation of online teaching, teachers cannot be able to interact with their students directly, which may decrease their efficacy in student engagement and online classroom management (Ramlo, 2021). This finding is also consistent with the findings of Robinia and Anderson (2010) and Horvitz et al. (2015) based on the sample of US college teachers, suggesting that student engagement and classroom management may be the two most prominent challenges for teachers in online teaching (Xu et al., 2022).

Further analysis showed that all measured demographic factors (including sex, age, lengths of teaching, title, highest degree, and major field) in the present study did not work on online teaching efficacy. This finding was somewhat different from traditional offline teaching setting. Previous studies revealed that teaching efficacy was increased with the length of teaching experience in offline classroom teaching

(Chang et al., 2011; Mehdinezhad, 2012). Based on social learning theory, previous successes are the most important factor influencing self-efficacy (Bandura, 1977). However, in the online teaching setting, both the objective teaching environment and the required subjective teaching skills have changed (Adedoyin and Soykan, 2023). Previous experience with offline teaching may not be transferred well to online teaching, teachers with different sexes, ages, lengths of teaching, titles, highest degrees, and major fields are still novices and in the exploratory stage.

In contrast to various demographic factors, all measured online teaching experiences (including teaching any online courses before, taking online teaching training courses or seminars, and discussing with colleagues) in the present study were associated with online teaching efficacy. This finding is in favor of the prediction of Bandura's social learning theory and previous studies (Van der Spoel et al., 2020; Dolighan and Owen, 2021), and suggests that teachers who had any experiences would quickly adapt to the changes in online teaching and showed relatively higher online teaching efficacy. However, based on the data collected in the present study, only 23% of college teachers had some online teaching experiences before the outbreak. This indicated that although Internet technology, computers, smartphones, and other electronic devices have been widely used in universities in recent years, online teaching is still a new thing in universities. For most teachers, the pandemic is the most direct force driving them to switch to online teaching.

Furthermore, the present study showed that taking online teaching training courses or seminars was associated with higher online teaching efficacy. In online teaching training courses and seminars, individuals would get some theoretical knowledge and practical skills targeted at online teaching (Goodyear et al., 2001), which in turn increased their competence and efficacy in online teaching. A detailed analysis found that such training courses' benefits were observed both for college teachers with and without any prior online teaching experience, and 71% of teachers believed participation in training or seminars for online teaching courses is "very necessary" or "necessary" for the successful implemented of online teaching. However, the present study revealed that nearly half (45.6%) of college teachers did not take any online teaching training courses or seminars. Further support in online teaching-related knowledge and skills training and support is needed in universities (Hassan et al., 2020; Akram et al., 2021; Aslam et al., 2023).

Meanwhile, our results showed that discussing with colleagues also positively affected online teaching efficacy, especially in online teaching strategies and computer skills. Social learning theory proposes that, in addition to one's own experiences, learning from others also works on one's self-efficacy. However, discussing and exchanging with colleagues did not affect online teaching efficacy in student engagement and classroom management. This may be that compared to the more procedural and relatively easy-to-acquired skills in computer use and teaching strategies, student engagement and classroom management is a much more complex process, especially in online teaching situations where face-to-face contact with students is absent.

## Implication

The current research also held significant implications for online instruction in the post-pandemic era. While the concept of digital transformation is not groundbreaking, many educators found

themselves thrust into the world of online teaching during the COVID-19 crisis. Moreover, the transition from traditional classroom instruction to virtual platforms is not merely a matter of replication; the nuances of offline teaching do not seamlessly translate to digital environments. As such, specialized training programs focused on online pedagogies are essential for college teachers well-prepared for online teaching. Meanwhile, providing teachers with more platforms and opportunities to communicate with each other would be also an effective way to improve college teachers' online teaching competence and efficacy through peer support.

## Limitations and future research direction

Some limitations should be acknowledged for the present study. First, although the sample in this study came from a wide range (including 44 universities), a relatively small sample size and just focus on college teachers may limit the generalizability of the findings of this study. Future studies are needed to validate the findings of the current study in a larger sample and in different education settings (e.g., teachers at university, secondary, or elementary school). Second, the data of the present was collected only for teachers in a self-report manner. Although all the participants responded anonymously, social desirability would be inevitable, and how teachers' online teaching efficacy related to students' motivation and academic performance remains unclear. Third, due to the cross-sectional nature of the present study, we can only characterize the status of online teaching efficacy at a point in time, whether as time went on the increasing experience would improve their teaching efficacy or ongoing challenges would decrease their teaching efficacy. Longitudinal studies are needed to chart the developmental trajectory of online teaching efficacy.

## Conclusion

The present study demonstrated that although few (about 1/5) college teachers had online teaching before the pandemic, the overall online teaching efficacy is relatively high. Since online teaching is a new thing for most teachers, sex, age, lengths of teaching, title, highest degree, major field, etc. various demographic factors that were associated with offline teaching efficacy did not affect online teaching efficacy. However, any relevant online teaching experience, including having any online teaching courses before, taking online teaching training courses or seminars, and discussing with colleagues would contribute to the online teaching efficacy.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving humans were approved by Ethics Committee of the School of Psychology Northwest Normal

Univer. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

## Author contributions

SL: Writing – review & editing, Writing – original draft, Supervision, Funding acquisition, Formal analysis, Data curation, Conceptualization. QX: Writing – review & editing, Validation, Methodology, Investigation, Data curation. BD: Writing – review & editing, Validation, Methodology, Investigation, Formal analysis, Data curation.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2024.1391251/full#supplementary-material>

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