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Research Article

The Role of Computer Self-Efficacy in High School Students' E-Learning Anxiety: A Mixed-Methods Study

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Abstract

E-learning anxiety plays a key role in students' success in online courses. One of the factors that may affect students' e-learning anxiety is computer self-efficacy (CSE). However, the role of CSE in high school students' e-learning anxiety has remained unexplored in the Iranian context. Therefore, the present mixed-methods study purports to explore the role of CSE in Iranian high school students' e-learning anxiety. To this end, for the quantitative part, 410 female high school students were selected, as well as for the qualitative part, 30 female high school students were selected using a random sampling method. The required data were collected using a computer self-efficacy questionnaire, an anxiety in online classes questionnaire, and semi-structured interviews. The collected data were analyzed through a Pearson correlation analysis, a multiple-regression analysis, and a content analysis. Results revealed a strong negative correlation between the students' CSE and e-learning anxiety. Further, the findings documented that the factors of CSE (i.e., beginning skills, mainframe skills, and advanced skills) determined the high school students' e-learning anxiety. Moreover, the complementary qualitative findings yielded four overarching themes: 'promoted digital literacy', 'increased problem-solving', 'increased learning satisfaction', and 'enhanced self-regulated learning'. Finally, a range of implications is suggested for different stakeholders.

Keywords: computer self-efficacy, e-learning anxiety, content analysis, high school students, online classes

INTRODUCTION

It is over two decades that education centers have tried to offer a part of their educational programs online. This is due to the growing requests on the part of students to enroll in online courses (Allen & Seaman, 2017) and the appealing learning opportunities offered to students in online courses (Alqurashi, 2016). Considering

the sustained demand to enroll in online courses, it is essential to do research to verify the factors determining university students' success in online courses. One of these factors is anxiety. Similar to face-to-face classes, students in online classes may experience anxiety which is due to the use of computers and technology devices. It is a reality that using computers and technology devices may generate some unpleasant feelings. These include strong, negative emotional states arising when a student is interacting with computers and technology devices to learn online (Saadé & Kira, 2009). In actual fact, as Zhou and Yu (2021) note, emotional states such as confusion, anger, anxiety, and frustration affect a student's interactions with computers and technology devices, learning, productivity, and overall well-being. In this regard, we can define e-learning anxiety as a feeling of being apprehensive or fearful when learning in online classes.

However, it should be stressed that students' e-learning anxiety is a notion that may be shaped and affected by other factors such as CSE. According to Alqurashi (2016), CSE is an individual's level of confidence to use computers to do a task or handle a challenge. If university students believe that they have the required computer knowledge and skill to achieve the intended results, they will take up the necessary steps to do research the results. These students do not consider working with computers as a hurdle to avoid. Instead, they approach computers as a facilitating tool to do learning tasks efficiently and quickly (Dang et al., 2016; Wolverton et al., 2020). Consequently, this may lead to promoted learning and improved performance and pave the way for students' higher satisfaction with online classes. The relationship between CSE and satisfaction with online classes has been investigated in the literature. In general, previous studies have evidenced that CSE is a strong predictor of students' e-learning anxiety in online classes (Saadé & Kira, 2009; Zhou & Yu, 2021).

Given the points above, it is quite essential to disclose the role of students' CSE in their e-learning anxiety in online courses. Casting light on the role of students' CSE in e-learning anxiety enables education officials to improve the quality of online courses (Alqurashi, 2016; Kuo et al., 2014). To the best knowledge of the researchers, the correlation between high school students' CSE and e-learning anxiety in online courses has remained unexplored in Iran. Therefore, the present study aims to fill up the lacuna by exploring the correlation between Iranian students' CSE and e-learning anxiety in online classes both quantitatively and qualitatively. It is hoped that the present study's findings can bring about valuable insights for education officials to detect areas for improvement in online courses.

LITERATURE REVIEW

Computer Self-Efficacy

The theoretical foundation of the present study rests on Social Cognitive Theory (SCT) (Bandura, 1986, 1997). SCT has been widely accepted as a validated model to understand and predict human behavior, as well as to develop and present methods to change human behaviors. SCT has been based on the premise that "the meta progress of a human being occurs through consecutive interactions with the outside environment and the environment must be subjected to one's cognition process before they affect one's behavior" (Wu et al., 2010, p. 5). SCT suggests there exists triadic reciprocal causation among environmental factors, cognitive factors, and human behaviors (Maddux & Gosselin, 2012). According to Wood and Bandura (1989), cognitive and environmental factors shape and affect human behaviors. In line with this theory, an individual's cognition, affect, and biological features are related to the cognitive factors. The social and physical features affecting an individual's behavior are related to the environmental factors (Wu et al., 2010).

One of the cognitive factors affecting students' behaviors is self-efficacy. In general, it is concerned with a student's belief in his/her abilities to successfully achieve learning objectives (Wu et al., 2010). According to SCT, the clues from four information sources form a student's perceptions of self-efficacy. They include attitudes about a task, past experience and familiarity with similar tasks, vicarious learning, and social support and encouragement (Maddux & Gosselin, 2012). Drawing upon self-efficacy, CSE was derived (Marakas et al., 1998).

According to Compeau and Higgins (1995), CSE is defined as "a judgment of one's capability to use a computer" (p. 192). In other words, CSE is a student's confidence in his/her capabilities to do particular learning tasks with the help of computers (Hauser et al., 2012; Wolverton et al., 2020). It is over two decades that researchers have begun this construct with the emergence and development of online courses across the globe. For example, the previous studies have evidenced that CSE is a strong predictor of students' satisfaction with online courses (Lim, 2001), has a positive and significant impact on students' learning readiness in online courses (Achukwu et al., 2015), and exerts a positive effect on students' performance expectations in online courses (Wu et al., 2010). Additionally, prior studies have indicated that students' expectations and perceptions of effective performance to the learning course increase when their CSE improves (Burkhard & Roldan, 2009; Shih, 2006).

E-Learning Anxiety

It is deemed that a crucial factor determining students' achievement in online courses is anxiety. According to Dörnyei (2009), anxiety is a combination of negative emotional responses which includes fear, worry, apprehension, and agitation. Anxiety is classified into two distinct areas: worries and cognitive arousal (Eysenck & Calvo, 1992). An individual cannot focus on doing a task as anxiety produces worries. However, when anxiety affects adversely an individual's ability and alertness to do a task, it generates cognitive arousal effects. The combination of worries and cognitive arousals affects an individual's processing efficiency. Accordingly, as anxiety consumes a major part of attention, it exerts a negative role in the processing capacity which is required to tasks efficiently and effectively.

When it comes to online education, anxiety is termed e-learning anxiety. E-learning anxiety is defined as the emotions of apprehension, fearfulness, and uneasiness in online education (Saadé et al., 2013). As Kira et al. (2018) note, e-learning anxiety is viewed as "a feeling of fear from misuse of information technology compromising course performance" (p. 3). In line with the socio-cognitive theory, it can be argued that e-learning anxiety may adversely affect the thought, affect, and behavior of students in online classes (Banduara, 1986; Paul & Glassman, 2017). According to Paul and Glassman (2017), students with high e-learning anxiety may have lots of problems. For example, they might suffer from physical discomfort (e.g., racing heartbeat), maladaptive thought processes (e.g., I cannot learn in online classes), and avoidance of attending online classes altogether (e.g., avoiding online classes to learning something new).

Students' e-learning anxiety may be created by various factors (Bates & Khasawneh, 2007). For example, Abdous (2019) reported that low learning efficiency and uncertainty were the major reasons for college students' anxiety in online classes. In other studies, it was revealed that other factors, including low computer confidence or skills, inability to manage the course tasks, unpreparedness for online courses, and low control of locus due to distractions online (Bates & Khasawneh, 2007; Saade et al., 2013). Additionally, Sun and Rueda (2012) found that students' confidence in completing online classes decreases due to the rise of e-learning anxiety. Finally, Cao et al. (2020) found that social support is adversely affected by e-learning anxiety. What is clear from the literature is that e-learning anxiety is a critical factor in online classes that may affect and be affected by diverse factors.

Empirical Studies

In the literature, a range of related studies has been carried out. To lay the groundwork for the present study, we critically review them. In an early study, Salanova et al. (2000) explored the moderating role of CSE in the connections among computer training, burnout, and frequency usage. Their findings evidenced that the CSE was positively correlated with computer training and computer usage. However, the CSE was negatively linked with the computer burn-out. Additionally, Alenezi et al. (2010) investigated the effects of computer anxiety, enjoyment, CSE, and Internet anxiety on university students' intention to use e-learning. Their results evidenced that the university students' intention to use e-learning was influenced by CSE, computer anxiety, and enjoyment. Further, Saadé and Kira (2009) researched the effects of CSE on computer anxiety among university students in Canada. They found that CSE is a strong predictor of the participants' computer anxiety. Moreover, Simsek (2011) examined the correlation between elementary school teachers and students'

computer anxiety and CSE in Turkey. The findings documented that there was a moderate negative correlation between the participants' computer anxiety and CSE. Besides, Chen (2012) explored the correlation between Tawnies elementary teachers' computer phobia and CSE. The results evidenced that there was a negative moderate correlation between the teachers' computer phobia and CSE. Likewise, Celik and Yesilyurt (2013) scrutinized the role of attitudes to technology, perceived CSE and computer anxiety in the use of computer-supported education. They found that the use of computer -supported education was significantly affected by perceived CSE, computer anxiety, and the attitude toward technology. In addition, Lee and Huang (2014) tested the correlation between computer literacy and computer anxiety with respect to the role of gender in Taiwan. Their findings showed that computer literacy was negatively correlated with computer anxiety in females than males. Achim and Al Kassim (2015) examined the correlation between computer anxiety and CSE among employees. They uncovered a weak correlation between the participants' computer anxiety and CSE. Finally, Balogun and Olanrewaju (2016) investigated the role of CSE and gender on Nigerian undergraduate students' computer-based test anxiety. Their results showed that the participants with higher level of CSE experienced less computer-based anxiety. Moreover, the findings indicated that the female participants reported higher level of computer-based anxiety than male participants.

The above-reviewed studies suffer from some limitations. First, the sample of the participants has not been large enough to rely on the generalizability of the findings. Second, they have used only quantitative design and the qualitative perspective was not investigated. Third, no study has investigated the correlation between high school students' CSE and e-learning anxiety in online courses in Iran. To bridge the gaps, the following research questions were raised:

1. Is Iranian high school students' computer self-efficacy correlated significantly with e-learning anxiety in online courses?
2. Which factors of computer self-efficacy shape Iranian high school students' e-learning anxiety in online courses?
3. What are Iranian university students' perceptions of the effects of computer self-efficacy on e-learning anxiety in online courses?

METHOD OF THE STUDY

Research Design

The researchers used an explanatory mixed-methods design. That is, the qualitative data were gathered after quantitative data to complement one another. The reason for this was to reach triangulation. As Riazi (2016) notes, the researchers collect both quantitative and qualitative data to gain deep insight into the different perspectives of the topic under research. Hence, this study aims to further our understanding of the effects of CSE on e-learning anxiety on online courses both quantitatively and qualitatively.

Setting and Participants

The setting of the present study was two high schools in Khoram Abad City, Iran. Using a random sampling method, the researchers selected 410 female high school students in Zeinabeh High School and Shahed High School for the quantitative part. The random sampling method, as its name suggests, provides an equal chance of selection for all individuals in a population to participate in a study (Mackey & Gass, 2016). The participants were grade 1, 2, and 3 and they aged ranged from 15 to 19 years old. Because high schools are run based on a single-gender education system in Iran, male students were not included in the study. The underlying reason for selecting the participants was that they were in line with the study's objectives. For the qualitative part, a total of 30 students were selected from the participants taking part in the quantitative part through a random sampling method.

To meet ethical requirements, the first researcher referred to the offices of the high schools. After a warm greeting, he explained the present study's objectives to the high school principals. Having answered the

questions of the high school principals, he asked if it was possible to run the study in their school settings. The high school principals allowed the present study to be run and they gave students' phone numbers. Afterward, the researchers contacted the students, introduced themselves, explained the study's objectives, and asked if they were willing to participate in it. Next, the researchers sent a digital format of written consent to the students who agreed to participate willingly in the study via What'sApp. As the present study was run during the COVID-19 pandemic, all high school students were obliged to install What'sApp on their phones to be in contact with their teachers and classmates. The students signed and turned back the written consent to the researchers (N=410). The researchers informed them that they would send the digital format of the questionnaires with a podcast explaining how to respond to the items. It is worthy to note that the researchers underlined that the participation in the present study is not compulsory and the students could withdraw it as they wished. More importantly, they assured the high school principals and students that their responses would remain confidential and they would be informed about the final findings.

Instruments

The researchers used two questionnaires and semi-structured interviews to gain the required data. The first questionnaire included the Computer Self-Efficacy Questionnaire (CSEQ). It was developed and validated by Murphy et al. (1989) and the researchers used it to measure the participants' self-efficacy. CSEQ assesses three skill levels, including beginning-level computer skills (16 items) (e.g., I feel confident choosing a data file to view on a monitor screen), mainframe computer skills (3 items) (e.g., I feel confident logging off the mainframe computer system.), and advanced level computer skills (13 items) (e.g., I feel confident troubleshooting computer problems). CSEQ entailed five-point Likert scale items which ranged from 1 (strongly disagree) to 5 (strongly agree). The second instrument included the Anxiety in Online Classes Questionnaire (AIOCQ). AIOCQ was designed and validated by Bolliger and Halupa (2012) and gauges students' anxiety in online classes. It consists of three factors: online course (6 items) (e.g., I am apprehensive about enrolling in online courses.), the internet (5 items) (e.g., I get nervous about getting lost in cyberspace.), and computer (6 items) (e.g., I am quite relaxed when I work with computers.). It comprises five-point Likert scale items that ranged from 1 (strongly disagree) to 5 (strongly agree).

The second instrument was semi-structured interviews. The researchers administered the semi-structured interviews to disclose the participants' perceptions of the effects of CSE on their e-leering anxiety in the online courses. The semi-structured interviews were run in the space of the Adobe Connect Platform. For this purpose, the researchers asked the participants to install the Adobe Connect Platform on their phones. The first researcher run the interviews. After a warm greeting with the students, he started the interview by asking this question: How do you feel about the online classes. The interview continued until the participants expressed their perceptions of the effects of CSE on e-learning anxiety. It should be noted that each interview lasted around one hour and it was run in the students' mother tongue to let them express their opinions with ease. The researchers recorded the interviews sessions to analyze them later.

Of particular note is that prior to running the study, researchers assessed validity and reliability of the questionnaires through a pilot study. For this purpose, they recruited two experts in translation to translate the questionnaires into Persian. This was done to avoid any probable misunderstanding from the students and increase the reliability and validity of their responses. Then, they distributed them among 65 students in another high school. The reliability for the CSEQ (0.87) and for the AIOCQ (0.92), respectively. Then, the researchers invited two associate professors in Psychology to comment on the questionnaires in regard to the face and content validities. Based on their comments, two items were modified to be more readable.

Data Collection Procedures

The researchers took some steps to conduct the present study. In the first step, they recruited two experts in translation to translate the questionnaires into Persian. In the second step, they run a pilot study to measure the reliability and validity of the questionnaires. In the third step, they sent the digital format of the questionnaires accompanied by a podcast voice. In the podcast, they explained the study's objectives and how the participants could respond to the items. The researchers informed the participants that they would

be online to answer their questions concerning the items. If one of the participants face difficulty understanding the items, the researchers contacted her and removed the problem. The students' responses were gathered in a data set. In the fourth step, the first researcher administered the semi-structured interviews with 30 of the students who completed the questionnaires. As noted above, the semi-structured interviews were run in the meeting room of the Adobe Connect Platform. The semi-structured interviews were recorded and, then, translated into English by two professional translators.

Data Analysis Procedures

As the collected data were quantitative and qualitative, the data analyses procedures were governed by the two kinds of data. Regarding the quantitative data, the researchers utilized SPSS version 23. They calculated the basic descriptive statistics, such as mean and standard deviation. Then, they used the Pearson correlation test to see if there was any significant relationship between the students' CSE and e-learning anxiety in the online courses. Further, they run the multiple regression test to reveal which components of CSE determined the students' e-learning anxiety.

For the qualitative data, the researchers used an inductive content analysis approach. According to Riazi (2016), it is a data analysis approach to identify themes and patterns in a set of data (e.g., written, visual, and oral) which has been collected systematically. In line with the recommended procedures by Dörnyei (2007), the data were analyzed through distinct steps: *open coding*, *axial coding*, and *selecting coding*. In the open coding, the first researchers read over and over the transcripts so much so that he could understand them well. Then, he broke the data into discrete parts to create codes and label them. The primary purpose of breaking up the data and labeling them was to enable the first researcher to compare and contrast the similar the concepts in the data. In the axial coding step, he started to draw connections between the codes. In other words, he read over the codes and the underlying data to find how they can be grouped into themes and patterns. In the selecting coding, the researchers went through the previous steps and tried to collect all the themes and patterns around one core category. It should be underlined that the researchers assessed the reliability and validity of the findings. Concerning the reliability, they recruited two coding experts to code the data independently. The inter-rater reliability of their coding was (0.85) which was considered satisfactory for the present study. Regarding the validity, they used a member checking strategy. In doing so, they gave a copy of the final themes and excerpts to 5 students and asked them if they matched their intended meanings. In general, the students reported that the extracted themes and excerpts represented adequately their intended meanings.

FINDINGS

Quantitative Findings

The first research question explored if there was any significant relationship between high school students' CSE and e-learning anxiety in the online courses in Iran. The researchers examined if the data were normally distributed before running the Pearson correlation test. For this, they used a Kolmogorov-Smirnov test and the calculated results for the CSE scale and the anxiety scale were ($KS_{(410)}$=.45, p>.05) and ($KS_{(410)}$=.42, p>.05), respectively. Based on these findings, the researchers concluded that the data were normally distributed. Next, the researchers calculated the basic descriptive statistics, as reported in **Table 1**. The mean (M) and standard deviation (SD) for the CSE (M=87.57, SD=15.49) and for the e-learning anxiety ((M=83.29, SD=15.10) were calculated, in order.

Table 1. Descriptive statistics of high school students' CSE and e-learning anxiety in online classes

	N	Mean	Standard deviation
CSE	410	87.57	15.49
Anxiety	410	83.29	15.10

Table 2 presents the correlation between computers the participants' CSE and e-learning anxiety in the online courses. As reported in **Table 2**, a strong negative correlation existed between the participants' CSE and e-

learning anxiety in the online courses. This is shown in the estimated coefficient of (r=-0.75, p<0.01, N=410). This means that the more students feel confident in using computers, the less they feel anxious.

Table 2. Correlation between CSE and e-learning anxiety among high school students

		Anxiety
Computer self-efficacy	Pearson correlation	-.75
	Sig. (2-tailed)	.000
	N	410

The second research question explored which sub-factors of CSE determine the participants' e-learning anxiety in the online courses. To answer this question, the researchers used a multiple regression analysis. However, to use this test, the researchers checked the assumptions. First, they checked the linearity assumption. The scatter plot matrix of the relationship among the sub-components of CSE revealed no curvilinear relationship. Second, they used Kolmogorov-Smirnov test to check the normality assumption. The calculated findings yielded beginning (KS=.57), advanced (KS=.63), and mainframe skills (KS=.37), which were all above the significance level (p>.05). After assuring that the required assumptions were met, the researchers used the multiple regression analysis to assess the effects of the factors of CSE on the students' e-learning anxiety.

Table 3. Multiple regression analysis on the effects of CSE dimensions on e-learning anxiety

	Sum of squares	df	Mean square	F	Sig.	R	R^2
Regression	57150.617	3	23796.35	88.455	.000	.68	.42
Residual	66162.845	406	282.15				
Total	123312.462	409					

As reported in **Table 3**, the results of a one-way ANOVA analysis indicate that the regression model reached the statistical significance (F=88.455, p<0.001). Further, the value of R^2 (0.42) is significant. It means that 42% of the variance in the participants' e-learning anxiety in the online courses could be accounted for by the factors of the CSE. In the next step, the researchers wanted to determine which factors highly contributed to the prediction of the students' e-learning anxiety in the online courses.

Table 4. Results of multiple regression analysis for students' CSE factors

Dimensions	Unstandardized coefficients		Standardized coefficients		
	B	Std. error	Beta	t	Sig.
(Constant)	43.15	5.07		21.22	.000
Beginning	2.88	.59	.32	13.23	.000
Main frames kills	2.71	.53	.51	11.14	.000
Advanced	1.75	.48	.30	9.25	.070

Dependent variable: Anxiety

As presented in **Table 4**, based on the beta values of CSE sub-components, it can be said that the students' e-learning anxiety was mainly affected by beginning (β=.59, p<.001) and mainframe skills (β=.53, p<.001), and advanced skills (β=.53, p<.001), respectively.

Qualitative Findings

The third research question investigated in which ways the students' CSE could affect anxiety in the online classes. The students' responses were subjected to an inductive content analysis, and the findings yielded five overarching themes: 'promoted digital literacy', 'increased problem-solving', 'increased learning satisfaction', and 'enhanced self-regulated learning'.

Promoted digital literacy

'Promoted digital literacy' was the first recurring theme catching the students' attention. The participants asserted that as they enjoyed a high level of CSE, they could improve their digital literacy. In this regard, one of the students quoted:

> "I think that there is a direct relationship between my computer self-efficacy and digital literacy. I mean that as I feel confident in using computers to facilitate my learning in the online courses, I could expand my knowledge and skills of the digital world. In this way, I could raise my self-efficacy in using computers simultaneously."

Resonating with the former statement, the participants underlined that CSE is a key factor to develop their digital literacy. The following excerpt shows this clearly:

> "Well, you know that when an individual is confident about their abilities in doing a task, they try to experience it. Through this experience, they can construct their required knowledge and skills by rectifying and correcting the lacks. This is true for computer self-efficacy. With the use of computers, I can experience more new things and, accordingly, I can develop my digital literacy. As I have good digital literacy, I could handle the tasks and obligations in the online classes, and, thus, feel less anxious."

Increased problem-solving skills

The next recurring theme that emerged from the students' responses was 'increased problem-solving skills. They stressed when they know that they have the required abilities to use computers efficiently, they can solve their learning problems better. In this respect, one of the students commented:

> "My problem-solving skills have improved as my confidence in using computers has increased. I mean that with the increase of my computer self-efficacy, I could solve my learning difficulties through testing different options. As I know that I could solve my learning problems, I did not get anxious."

Furthermore, the students underlined that with the increase of their CSE, they earned new problem-solving skills. In support of this, one of the students quoted:

> "With the increase of my computer self-efficacy, I could try new things and gain new problem-solving skills. For example, when I faced a tough question, I could gather the needed data, analyze them, and find a good solution for it. Therefore, I could control my anxiety in the online classes."

Increased learning satisfaction

The other theme extracted from the students' responses was 'increased learning satisfaction'. The participants highlighted that as they could use their digital abilities in the online classes, they got more learning satisfaction. In support of this, one of the participants remarked:

> "At the beginning of the online classes, I did not have the necessary knowledge and skills to use computers to benefit most from them. Over time, as my confidence increased in using computers, I got more satisfied with the online classes. I knew how to handle my learning obligations and thus, I did get less anxious."

Corroborating with the former statement, one of the participants quoted:

> "This is a reality that there is a mutual relationship between the achievement and learning satisfaction in the online classes. As my self-efficacy in using computers increased, I could achieve more promising results. Therefore, I felt more satisfied with the online classes. This satisfaction directly lowered my anxiety in the online classes."

Enhanced self-regulated learning

The last recurring theme was 'enhanced self-regulated learning'. The students stressed that when they felt confident in using computers to remove their needs and lacks, they got more regulated leaners. The following excerpt lends support to this:

> "I could benefit from the flexibility and convenience of the online classes as my confidence in using computers has increased. As I increased my computer knowledge and skills, I could learn at my own pace. I mean that I could rectify and correct my learning gaps by relying on my own abilities."

In agreement with the former statement, the students stressed that they could progress in line with their talents and interests. In this regard, one of the students remarked:

> "As opposed to the traditional classes, the online classes let me learn based on my interest and time. I could regulate my learning based on my conditions. Therefore, it did not make me anxious to keep pace with the class. Therefore, I got more self-regulated in my learning."

DISCUSSION

The first research question explored if the Iranian high school students' CSE was correlated significantly with their e-learning anxiety in online courses. The findings indicated that there was a strong negative correlation between the participants' CSE and e-learning anxiety in the online courses. The results indicated that the participants with higher CSE became less anxious in the online courses. Based on the findings, it may be argued that the high school students with a high level of CSE might have felt confident in using their digital knowledge and skills to handle the obligations and tasks in the online courses. Hence, they might have suffered less from anxiety. In other words, align with the study's results it may be argued that the lack of CSE might have caused a feeling of anxiety and fear on working with computers and new technology devices to benefit from the online classes sufficiently.

The second research question explored which factors of CSE shaped the Iranian high school students' e-learning anxiety in online courses. The findings evidenced that the participants' e-learning anxiety was affected by all the three components of CSE. That is, the beginning, advanced, and mainframe skills contributed to the participants' e-learning anxiety. The study's results evidenced that the students with beginning, advanced, and mainframe skills were capable of using computers to write a letter and essay. They found this task not too demanding, therefore, they did not experience anxiety. Additionally, along with the findings, it may be argued that the students with low CSE might have experienced more e-learning anxiety. This student might have experienced fear of the unknown, possible embarrassment, feeling of frustration, and disappointment. This, accordingly, may have resulted in avoidance of using computers (Achim & Al Kassim, 2015). The students feeling that they lack the required abilities in using computers to meet their learning needs in the online classes may have shown more anxiety as an affective reaction to this situation.

The third research question investigated what the Iranian university students' perceptions are of the effects of CSE on e-learning anxiety in online courses. The qualitative findings yielded four overarching themes: promoted digital literacy, increased problem-solving skills, increased learning satisfaction, and enhanced self-regulated learning. The students who had a higher level of CSE might have promoted their digital literacy, increased their problem-solving skills, increased their learning satisfaction, and became more self-regulated learners. This all might have contributed to decreasing their e-learning anxiety. In light of the study's results, it may be argued that the students with higher CSE may have got motivated to enter learning challenges in the online classes, because they might have felt that they are equipped with the required knowledge and skills to handle the learning challenges (Celik & Yesilyurt, 2013). The findings may be discussed from this perspective that the more the students feel confident in handling computers in their learning, the more they might have incorporated with them.

The study's findings are in line with those of Salanova et al. (2000), indicating that the CSE was positively correlated with computer training and computer usage. Additionally, the results of the study are in consistent with those of Alenezi et al. (2010), reporting that the university students' intention to use e-learning was influenced by CSE, computer anxiety, and enjoyment. Further, the study's results lend support to the findings of Saadé and Kira (2009). They found that CSE was a strong predictor of the participants' computer anxiety.

Moreover, the study's results are in congruent with those of Simsek (2011), documenting that there was a moderate negative correlation between the participants' computer anxiety and CSE. In addition, the findings of the study lend support to those of Lee and Huang (2014), reporting that computer literacy was negatively correlated with computer anxiety. Achim and Al Kassim (2015) examined the correlation between computer anxiety and CSE among employees. They found a weak correlation between the participants' computer anxiety and CSE. Finally, our results lend credence to the findings of Balogun and Olanrewaju (2016). Their results showed that the participants with a higher level of CSE experienced less computer-based anxiety.

The study's findings might be explained from this perspective that the participants with high CSE might have felt confident in using computers and technology devices. These students might have shaped positive attitudes toward computers to make the learning objectives realized in the online classes. These positive attitudes might have facilitated the development of their digital literacy, increased their motivation to keep learning, and promoted their interests in the online classes (Venkatesh et al., 2000). Put it in other words, along with Compeau and Higgins (1995), it can be argued that as the students shaped positive attitudes toward computers and device technologies, it might have decreased their resistance to work with them. Additionally, another line of discussion for the study's findings may be associated with this view that the students with higher CSE might have taken more risks to handle the obligations of the online classes. Therefore, they may have felt less anxious facing new challenges (Beckers et al., 2006). Further, the study's findings may be explained through the technology satisfaction model (Islam, 2014). According to this model, it may be argued that the students who privileged higher CSE, might have found the use of the computers easy and useful (Jiang et al., 2021). Thus, they may have had less fear of using computers and technologies devices to learn in the online classes (Bin et al., 2020). Moreover, the study's findings may be illuminated from this view that the students who believed in their abilities to use computers and information technologies might have achieved more satisfaction with the online learning. Thus, it is reasonable to argue that the more technologically satisfied the students were with the online classes, the less they might have felt anxious in the online classes (Islam, 2016; Islam et al., 2018).

Another line of the discussion for the findings may be ascribed to the self-regulated learning theory (Zimmerman, 2002). Align with this theory, it may be argued that the students how privileged high CSE, might have become more self-regulated learners. In this regard, the students how had high CSE might have been actively involved in the online learning meta-cognitively, motivationally, and behaviorally. Accordingly, they might have suffered less from the anxiety in the online classes. As the students become more self-regulated learners, they might have set their goals and plans adequately worked on their tasks and monitored their learning tasks (Jansen et al., 2020). The final line of discussion for the study's results may be offered in line with the technology acceptance model (Davis, 1986). According to this model, the principal factors in using computers and technology devices are the perceived ease of use and usefulness. Align with our findings, it may be argued that the participants with higher CSE might have believed that using computers would be free of physical and mental efforts as well as would improve their learning outcomes in the online courses.

CONCLUSIONS

As noted above, this mixed-methods study investigated the correlation between students' CSE and e-learning anxiety in the online courses. The findings documented that there was a strong negative correlation between the students' CSE and e-learning anxiety in the online course. Further, the results revealed that all the components of CSE (i.e., beginning, advanced, and mainframe skills) affected the students' e-learning anxiety. The complementary qualitative findings yielded four overarching themes: 'promoted digital literacy', 'increased problem-solving', 'increased learning satisfaction', and 'enhanced self-regulated learning'. The findings of the study indicated that CSE can be considered a strong predictor of the students' e-learning anxiety. According to the study's results, the students who had higher CSE, feared less in using computers and technology devices. Accordingly, they might have experienced less anxiety in the online courses. To close, in light of the study's findings, it can be concluded that the high CSE can be a strong clue that the students might believe that they can handle the obligations and tasks in the online classes

Based on our findings, a range of implications is offered. First, education officials need to improve high school students' CSE. For this purpose, they can design and hold training courses on computer use and technology devices. These training programs should assure that high school students can acquire the needed knowledge and skills to use computers and technology devices appropriately. Second, the syllabus designers should assign some compulsory courses on computer technologies for students from elementary cyclic. Those courses should cover the necessary materials about learning of computer applications (e.g., spreadsheets, word processing, and presentations) and computer literacy (e.g., moving a cursor, handling memory sticks, file organization, and using the help function) (Schlebusch, 2018). Third, high school teacher should be aware of the fact that all students might not have high CSE and get anxious in the online classes. Therefore, they need to help their students improve their CSE by offering training tips and feedback abilities. This might have students more time to focus on course content and increase their self-esteem. Forth, high school students should pay particular attention to promoting their computer knowledge and skills. They need to accept this fact that digital literacy is highly significant to get success in the online courses. Last but not least, since CSE can be developed through extensive use of computers and technology devices, high school students should expose themselves to computers regularly.

A range of suggestions for further research is presented in light of the limitations imposed on the present study. As this study selected the participants from two state high schools in Khorram Abad City, further studies need to be carried out with larger samples in other parts of the country to increase the generalizability of the findings. Besides, as the present study included female high school students, future studies can select participants from male high school students. Further, since the present study was limited to high school students, interested studies can include teachers to disclose how their CSE is related to their e-teaching anxiety. Likewise, future studies can be carried out to further our understanding of the correlation between CSE with other factors, such as technology satisfaction and technology motivation. Finally, as the present study used questionnaires and semi-structured interviews to collect the data, future studies can use other data collection instruments like observation to yield a more comprehensive picture of the correlation between high school students' CSE and e-learning anxiety.

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