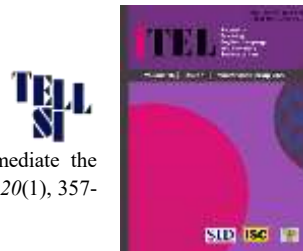


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Research Paper

Online English Classes in Iran: Does Student Satisfaction Mediate the Relationship between Online Learning Self-Efficacy and Reading Comprehension?

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Abstract

The shift to online education in universities, driven by the COVID-19 pandemic, sparked interest in understanding the factors that affect student achievement in virtual classrooms. This study explored how online self-efficacy and satisfaction with courses are related to students' reading comprehension. To assess these relationships, the researcher utilized Moodle to distribute three instruments—the Course Satisfaction Questionnaire (Frey et al., 2003), the Online Learning Self-Efficacy Scale (Zimmerman & Kulikovich, 2016), and the TOEFL reading section—to a sample of 312 university students. Data was analyzed via Partial Least Squares Structural Equation Modeling (PLS-SEM). Results indicated that online learning self-efficacy has a 0.37% effect on reading comprehension when mediated by

course satisfaction, with 0.30% of this being an indirect effect. This implies that while self-efficacy in online learning has a limited direct impact, course satisfaction substantially contributes to reading comprehension. The findings underscore the importance of course satisfaction in planning and implementing online courses. What distinguishes this research is its focus on the mediating role of course satisfaction in linking self-efficacy to academic performance, offering fresh perspectives on the mechanisms at play in digital learning settings. It should be noted that the data relied solely on students' self-reported perceptions of their experiences in fully online classes.

Keywords: Course Satisfaction, Mediation, Online Learning Self-Efficacy, Reading Comprehension, TOEFL

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1. Introduction

The COVID-19 calamity compelled all universities to hastily move to online teaching approaches, a change that many were not adequately prepared for (Henriksen et al., 2020). As a consequence, online education has become a required plan in many higher education institutions (Bao, 2020; Hodges et al., 2020). This shift was unexpected by students, professors and practitioners, who faced challenges in adapting both psychologically and technologically.

The widespread adoption of online learning has brought to light both potential benefits and obstacles related to educational equity and quality. This transition has spurred greater research interest in the effectiveness of virtual education, especially regarding teaching strategies, student engagement and

satisfaction levels. Research highlights the need for thoughtful integration of technology to fulfil the needs of the students (Bozkurt & Sharma, 2020), with growing attention on adaptable, learner-focused methods that enhance digital adaptability (Bond et al., 2021).

The rapid expansion of online instruction has prompted educators to explore various issues related to the quality of education delivered through this mode. One critical indicator of online learning quality and effectiveness is learner satisfaction (Alenezi, 2022). Research has demonstrated that students' self-efficacy in online settings plays a central role in determining the quality of their interactions, which ultimately impacts both instructors and learners (Zheng et al., 2020). Moreover, emotional engagement and social presence have emerged as important components in enhancing learner satisfaction, underscoring the need to foster meaningful communication in online platforms (Richardson et al., 2022).

Self-efficacy and course satisfaction are closely linked in online classes (Aldhahi et al., 2021; Dinh et al., 2022). It also affects academic performance by shaping students' motivation to use online resources (Alqurashi, 2018; Wang & Sun, 2020). Research shows that course satisfaction is essential in online learning success (Gopal et al., 2021). Furthermore, learner autonomy and digital skills are found to be critical in enhancing students' self-efficacy, especially when navigating complex online platforms and managing independent study (Martin et al., 2022).

Evaluating online education helps educators improve course design and delivery (Kuo et al., 2014). Understanding students' self-efficacy, satisfaction, and academic outcomes can help institutions address challenges in online learning. Growing concerns about educational equity highlight the digital split,

where unequal access to technology influences student experiences and satisfaction (Van Deursen et al., 2023).

This study explores how online learning self-efficacy indirectly influences reading comprehension through course satisfaction. It offers new understandings into the subtleties of online instruction and draws attention to the role of course satisfaction in improving the quality of this type of instruction. The findings highlight the need to embrace digital literacy and guarantee fair access to technology for better post-pandemic educational outcomes.

2. Literature Review

Learner self-efficacy is said to impact satisfaction and learning. Alqurashi (2016) defines self-efficacy as "the degree of self-confidence in performing an activity, action, or solving a problem" (p. 45). Students may not try to succeed if they believe they will not achieve high scores. Efficacious students do not see challenging activities or homework as obstacles, but rather as opportunities to improve. By adopting this mindset, learning can be improved and academic satisfaction can be increased. Learners' self-efficacy relates to the belief that they are skilled at executing a task (Bandura 1977); "Special self-efficacy" refers to the capacity to do a specific activity (Bandura 1986; Zimmerman 2000). In the words of Bandura (1977), self-efficacy affects the "start and continuity of a task" (193). Self-efficacy is essential for tackling and persisting in problem-solving (Bandura, 1977). Persistence and self-efficacy are closely related.

Researchers have shown interest in self-efficacy in education since the 1970s (Hodges, 2008). Self-efficacy in online learning, however, needs

further exploration to help educators find ways to enhance it. Some research studies have examined online learning self-efficacy from a technological standpoint (Alqurashi, 2016), as well as self-efficacy in computer use (Jan, 2015; Rahman et al., 2023), self-efficacy in information retrieval (Rodon & Meyer, 2018; Tang & Tseng, 2013), and self-efficacy in learning management systems (Martin et al., 2010). Other studies have explored learning aspects and self-efficacy in online instruction settings (Gebara, 2010; Li, 2020; Xiao, 2012).

Most computer self-efficacy research focuses on students' confidence in working with computers and applications. For example, Dalshad & Mustafa (2019), Jan (2015), Simões, et al. (2022) found that education and learner satisfaction are positively correlated. Jan identified the association between academic and computer-related self-efficacy, as well as previous experience and student satisfaction. Nevertheless, no significant association was reported between student computer self-efficacy and course satisfaction.

It appears that successful students in traditional and online classes are motivated and self-directed and have above-average internal control, interaction, and technical skills (Dabbagh, 2007; Quesada-Pallarès et al., 2019). There is no doubt that individual students differ in many aspects, including self-efficacy, perseverance, self-regulation, emotional skills and preference for instruction modes (online vs. face-to-face). It is unclear which learning styles and strategies work best for online learning. When planning their courses, teachers should consider factors influencing effective teaching. The design, management, and implementation of courses influence the outcomes of the instruction and ultimately impact students' satisfaction (Lee, 2014; Sharif Nia et al., 2023).

Efficacious use of computers and the Internet indicates how comfortable one is with using them to retrieve materials and data. Hammouri and Abu-Shanab (2018) correlate computer self-efficacy with student satisfaction in an e-learning class. Chen et al. (2019) have observed that self-efficacy also correlates with comfort in using electronic archives. Research has failed to establish a link between computer use efficacy and virtual class satisfaction (Jan, 2015; Simmering et al., 2009).

Satisfaction in online learning context refers to how learners perceive their educational experiences, which is closely linked to their participation and overall development (Rajabalee & Santally, 2021; Sahin & Shelley, 2008). High levels of satisfaction are crucial as they significantly contribute to the perseverance of online learners, encouraging them to continue and complete their courses (Kuo et al., 2013; Yu, 2022). Research has consistently shown that student satisfaction is a robust predictor of the effectiveness of online courses (Eom & Ashill, 2016; Suat, 2021). Furthermore, research has demonstrated that satisfied students are more inclined to engage in class activities that enhance their achievements and overall educational experience (Moore & Kearsley, 2011; Swan, 2001). The importance of satisfaction is underscored by its impact on retention rates, with satisfied students being less likely to drop the online courses (Hart, 2012; Lee & Choi, 2011). Therefore, understanding and improving student satisfaction is necessary for the development and success of online instruction (Garrison & Kanuka, 2004; Prifti, 2022; Shea, 2007; Wu et al., 2010).

According to Wu & Yu (2022), online learning may end in negative emotions such as disappointment. This is highly likely when the lesson design

is poor or when students are not skilled at using online education systems. Teaching methods and the structure of educational systems, as well as proper design of courses and support for students, can facilitate education and enhance course satisfaction (Dabbagh, 2007; Munna & Kalam, 2021). Researchers have addressed academic satisfaction in various ways. For example, Ke and Xie (2009) believe that systematic online courses satisfy learners. Ruey (2009) considers faculty feedback and facilitation methods important in satisfying students.

Kuo and Belland (2016) found a low-to-moderate connection between internet satisfaction and self-efficacy. Al-Azawei and Lundqvist (2015), however, failed to find a meaningful association between academic satisfaction and Internet efficacy. Kuo, et al. (2014) obtained a slightly positive connection between self-efficacy and student satisfaction. Moreover, they learned that student satisfaction and Internet efficacy were significantly interrelated. In Womble (2007), learner satisfaction and efficacy were also significantly correlated.

Researchers attempted to find variables that could affect learner satisfaction with online education. Gunawardena and McIsaac (2004) showed that student satisfaction was strongly correlated with online learning self-efficacy. A high relationship was discovered between task usefulness, self-efficacy, and learner satisfaction according to Artino (2007). It has also been established that task usefulness and self-efficacy can account for student satisfaction to some extent. Interactions in online classes are said to affect student satisfaction. Kuo, et al. (2014) identified some variables influencing learner satisfaction with online courses and realized that online efficacy,

learner comfort, and learner-teacher interactions could impact learner satisfaction.

According to Liaw (2008), students' satisfaction with online classes might be attributed to the online learning system. The study claimed that students' self-efficacy conceptions impacted their satisfaction with the education system. Various factors, including students' familiarity with the course background and their overall online learning experience, influence satisfaction with online courses (Sharif Nia et al., 2023). The quality of course content, technical support, organization, group dynamics, and feedback are critical determinants of learner satisfaction (Aguirre et al., 2023).

Gray and DiLoreto (2016) contend that course satisfaction and achievement are reliable gauges of online instruction efficiency. Richardson and Swan (2019) observed a noteworthy association between satisfaction with and achievement in online classes. Marks et al. (2005) maintained that a concrete outcome from a fruitful learning experience makes the student happy. Additionally, they discovered that student learning outcomes are reliable indicators of student satisfaction.

Online learners' satisfaction is influenced by many factors, including attendance (social, cognitive, teaching), lesson utility, user-friendliness of the platforms, content usefulness, computer skills, and flexibility (Joo et al., 2011; Wei & Chou, 2020). According to Garrison et al. (2021), 'teaching presence', which entails designing, facilitating, and guiding cognitive and social processes, significantly impacts student satisfaction. Cognitive presence, reflecting learners' capability to construct meaning through reflection and discourse, also affects satisfaction (Akyol & Garrison, 2011). Recent studies

show that these factors not only predict satisfaction but also improve achievements and retention rates (Martin et al., 2023; Shea et al., 2020).

Active learning, relevance, learner independence, formal education, and technological sufficiency are key contributors to student satisfaction (Getenet et al., 2024). Positive predictors of satisfaction include student-faculty interaction, student engagement with the content of the course, and the effectiveness of technology (Memon et al., 2022). Effective interaction among students and teachers is vital for course evaluation and overall satisfaction (Yang & Ghislandi, 2024). Additionally, the efficiency of online learning mechanisms significantly impacts academic satisfaction, with well-planned technological devices enhancing the learning experience (Sharif Nia et al., 2023). Key factors impacting student satisfaction include a rich learning environment, clear rules of classroom participation, teacher involvement, reduced ambiguity, a participatory environment, and recognition of training courses (Lewohl, 2023).

Students seem satisfied, active, motivated, and willing to help create an effective learning atmosphere. Dissatisfied students hinder the facilitation of professors' work. Teachers in such situations have difficulty communicating with the students and may mistakenly think that these problems are mainly related to learners' dissatisfaction with the phenomenon of online learning (Dziuban and Shea, 2007; Saro, 2023). According to Alqurashi (2018), student satisfaction was correlated with all six features of online learning environments (starting from $r = 0.22$ to $r = 0.38$, $P .01$): teacher support, personal need, student interaction and cooperation, active learning, student independence, and formal education.

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There are several tools for assessing students' satisfaction in online settings. Lim (2001) designed a tool to assess adult learners' satisfaction in online classes and their likelihood to enroll in future online courses. Binner et al. (1994) designed the Distance Course Assessment Questionnaire. It estimates seven factors of student satisfaction: instruction, technology, management, on-site staff, course presentation, out-of-class connection, and support services. A reliability index was reported for each factor in their study.

Kuo, et al. (2014) developed a questionnaire that included the following five dimensions: Global student satisfaction, student participation, student satisfaction with courses, and student inclination to take online courses. The reliability index reported in their study was 0.87. Gunawardena et al. (2010) also developed a questionnaire to estimate student satisfaction. This measure includes online self-efficacy, course design, interactivity between students and teachers, and learner satisfaction. They reported 0.83 reliability.

Miltiadou and Yu (2000) created the Online Technology Efficiency Scale (OTES), a 30-item instrument with four components: internet skills, simultaneous interaction, synchronous and asynchronous interaction. The reliability of this questionnaire was 0.95. Shen et al. (2013) developed a questionnaire consisting of five components, including self-efficacy in

1. Completing online courses,
2. Social interaction in classes,
3. Management of mechanisms in the course management system,
4. Online communication with teachers and
5. Communication with peers for academic goals.

Learner satisfaction and self-efficacy, among other factors, have a major role in all types of learning, including all language skills and components.

However, in the present study, the researcher focuses on reading comprehension because learners in EFL contexts need reading skills the most. Reading comprehension skills are necessary for EFL learners to improve their knowledge and success in learning English, as well as to grasp the contents in English-demanding classrooms (Nunan, 2003).

This study examines whether online learning self-efficacy directly affects reading comprehension or if course satisfaction mediates this relationship. More specifically, the study addresses this research question. *Does student satisfaction mediate the relationship between online learning self-efficacy and reading comprehension in online courses?*

3. Method

This section details the study's participants, instruments, and procedures.

3.1 Participants

The study recruited 376 engineering students, aged 19 to 22, enrolled in a mandatory general English course at a university in Tehran. Participants were selected based on their enrollment, ensuring a diverse sample from various engineering disciplines. The Moodle was employed to administer two questionnaires, the Course Satisfaction Questionnaire (Frey, Faul & Yankelov, 2003) and the Online Learning Self-Efficacy Scale by Zimmerman & Kulikovich (2016), as well as the TOEFL reading section. Out of the initial 376 students, 64 participants did not complete the questionnaires; the remaining 312 participants' responses and test results were analyzed.

3.2 Instruments

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The investigator used three instruments for this study, namely the Course Satisfaction Questionnaire, the Online Learning Self-Efficacy Scale, and the reading section of the Test of English as a Foreign Language. The instruments are described here.

3.2.1 Course Satisfaction Questionnaire

In the general English course referred to earlier, students were asked to complete the Course Satisfaction Questionnaire (CSQ) developed by Frey et al. (2003). It is a twenty-one-item questionnaire calibrated on a 7-point scale ranging from extremely dissatisfactory (1) to very satisfactory (7). Scores ranged from 21 to 147. In general, higher scores indicate greater satisfaction with the course. The reliability of this questionnaire, reported by Frey et al. (2003), was 0.97. For the current sample, Cronbach's alpha was estimated at 0.94.

The components and items of CSQ are:

Interaction between students and faculty: 1, 2, 3, 13, 14, 17

Content relevance: 5, 8, 9, 10, 11, 12, 20

Teaching/delivery: 4, 6, 7, 15, 16, 18, 19, 21

3.2.2 Online Learning Self-Efficacy Scale

A 22-item activity tool, the Online Learning Self-Efficacy Scale (OLSES), was introduced in 2016 by Zimmerman and Kulikovich. A score of 1 means the respondent believes they will not perform the task well. A score of 6 means they think they can do the task quite well. Scores ranged from 22 to 132. The reliability of this questionnaire was found to be 0.96.

The components and items of OLSES are:

Learning: 11,12,13,14,15,17,18,19,21,22

Time: 8,9,10,16,20

Technology: 1,2,3,4,5,6,7

3.2.3 Reading Section of TOEFL

The reading portion of the TOEFL was used to gauge reading comprehension. These test items include remembering the meaning of words, understanding word meaning in the text, comprehending the text and external sources, extracting information from the text, finding synonyms, obtaining specific information, understanding references and grammatical relations, and identifying the writer's style and tone. The reliability of the test was 0.86.

3.3 Procedure

The university's online learning platform was employed to deliver the TOEFL reading test, the Course Satisfaction Questionnaire (CSQ) and the Online Learning Self-Efficacy Scale (OLSES) to 376 students taking a general English course in the second semester of 2022.

Participants were required to complete the questionnaires by indicating their degree of endorsement or disapproval of each statement. For the Online Learning Self-Efficacy Scale, responses ranged from 1 (indicating low confidence in performing the task) to 6 (indicating high confidence). For the Course Satisfaction Questionnaire, responses ranged from 1 (extremely dissatisfactory) to 7 (very satisfactory).

Out of the initial 376 students, 64 did not fill out the questionnaires, leading to a sample of 312 contributors. The responses from these students were collected and analyzed. The analysis included assessing the connection

between students' satisfaction with the course, self-efficacy in online learning, and reading comprehension scores from the TOEFL.

4. Data Analysis

Data analysis was done via Smart PLS 4 software to test the relationships between online learning self-efficacy, course satisfaction, and reading comprehension. The analysis proceeded in several stages, beginning with preliminary assumption testing, followed by assessment of the measurement model and concluding with structural model evaluation.

5. Results

As Table 1 reads, the Kolmogorov-Smirnov test results are significant: p-values for Efficacy (0 .01), Satisfaction ($< .001$), and Reading Comprehension ($< .00$). Statistical literature consistently notes that this test becomes overly sensitive when the sample size exceeds 50, frequently flagging trivial, practically insignificant deviations from a perfect bell curve as statistically significant (Ghasemi & Zahediasl, 2012).

We examined the kurtosis and skewness values to determine the practical normality of the data. Kurtosis values ranged from -0.31 to 0.89 and skewness values ranged from -0.98 to -0.61. All values were within the threshold of ± 1.96 (George & Mallery, 2010). This helped us conclude that the distributions did not markedly deviate from normality. The standard deviations indicated moderate variability in the data, suggesting relatively consistency across all three variables.

More importantly, the mediation effects were evaluated using non-parametric bootstrapping which empirically calculates standard errors and confidence intervals directly from the data, bypassing the need for normality

assumptions entirely (Preacher & Hayes, 2008). Therefore, the minor deviations flagged by the Kolmogorov-Smirnov test do not violate the validity of our PLS-SEM results.

Table 1

Descriptive Statistics and Tests of Normality (N = 312)

Variable	Mean	Std. Deviation	Skewness	Kurtosis	K-S	K-S Sig.
Efficacy	90.16	21.37	-0.70	0.71	0.05	.01
Satisfaction	100.73	24.11	-0.98	0.89	0.09	.00
Reading	27.79	6.49	-0.61	-0.31	0.12	.00

Based on Hair et al. (2019), the study examined the direct relationships between the independent variables—online learning self-efficacy (hereafter, self-efficacy) and course satisfaction (hereafter, satisfaction)—and the dependent variable, reading comprehension. Analyzing these relationships was crucial before assessing the mediation effect. Figure 1 illustrates this relationship.



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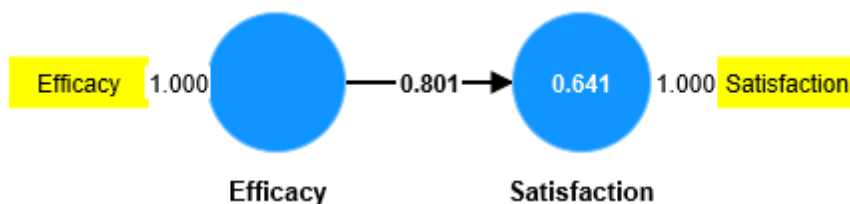


Fig. 1 Direct relationship between self-efficacy, satisfaction and reading comprehension

Figure 1 reveals key connections. Online self-efficacy correlates with reading scores at 0.38 and satisfaction at 0.44. These correlations translate to self-efficacy explaining 0.14% of reading comprehension variance, and satisfaction explaining 0.19%. Additionally, there is a strong positive link of 0.80 between self-efficacy and satisfaction, with self-efficacy accounting for 0.64% of course satisfaction variance. All coefficients exceed 0.20, indicating statistical significance (Wong, 2019). In simpler terms, reading comprehension is positively related to both self-efficacy and satisfaction. Enhancing these factors is likely to improve reading comprehension. The greater impact of satisfaction suggests it plays a critical role in the relationship between self-efficacy and reading performance. This aligns with previous research showing that self-efficacy boosts learning outcomes (Zimmerman & Kulikowich, 2016) and satisfaction (Hammouri & Abu-Shanab, 2018), and that satisfaction directly affects learning outcomes (Eom & Ashill, 2016). Higher self-efficacy generally leads to greater enjoyment and success in learning.

To assess the mediating effect of satisfaction between online learning self-efficacy and reading comprehension, the researcher used a structural model. This model assessed the direct effects of self-efficacy and student satisfaction on reading comprehension. The model also examined the major research question, restated below.

Does student satisfaction mediate the relationship between online learning self-efficacy and reading comprehension in online courses?

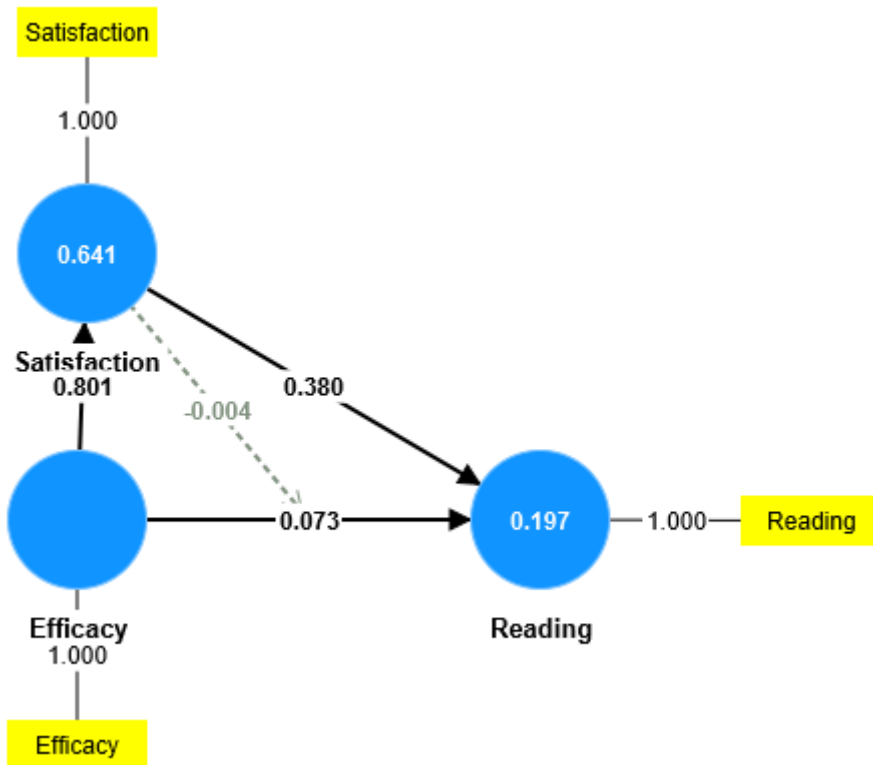


Fig. 2 The structural model of the relationship between self-efficacy, satisfaction and reading comprehension

Figure 2 shows that self-efficacy has a small effect (0.07%) on reading comprehension, while satisfaction has a much stronger effect (0.38%). This means satisfaction is more important than self-efficacy for improving reading comprehension. Self-efficacy also affects satisfaction by 0.80%. All these effects are statistically significant (Wong, 2019) because their coefficients are

above 0.20%. Bootstrapping confirmed the significance of these paths. The T-values are 1.20 for self-efficacy and reading comprehension, and 2.73 for satisfaction and reading comprehension. According to Wong (2019), a T-value greater than 1.96 means the path coefficient is significant at the 5% level. So, the link between satisfaction and reading comprehension is significant, but the link between self-efficacy and reading comprehension is not. This suggests that satisfaction mediates the relationship between self-efficacy and reading comprehension.

Table 2

Structural Model of the Effect of self-efficacy and satisfaction on reading comprehension

Variables	Total effects	Specific indirect effects	f-square (effect size)
Efficacy -> Reading	0.37		0
Satisfaction-> Reading	0.38		0.06
Efficacy->Satisfaction-> Reading		0.3	

According to the information presented in Table 2, self-efficacy has a total effect of 0.37% on reading comprehension, out of which 0.30% is an indirect effect. In other words, the direct influence of self-efficacy on reading comprehension is 7% ($F^2 = 0.06$). According to Cohen (1988) guidelines, the impact of self-efficacy on reading comprehension is insignificant, while the effect of satisfaction on reading comprehension is moderate.

In structural models, collinearity is a significant concern. According to Hair et al. (2011), a variance inflation factor (VIF) value of 5 or higher

indicates collinearity. In this study, the VIF values for the relationship between self-efficacy and reading comprehension (2.79) and satisfaction and reading comprehension (3.02) are both below the threshold of 5, indicating no collinearity issues. This indicates that the relationships are not affected by multicollinearity and the results are reliable.

Table 3

Model fit of the structural model of self-efficacy, satisfaction, and reading comprehension

Indexes	Saturated model	Estimated model
SRMR	0.00	0.00
d_{ULS}	0.00	0.00
d_G	0.00	0.00
NFI	1.00	1.00

According to Table 3, the SRMR (standardized root mean squared residual) is 0.00. The d_{ULS} (unweighted least squares discrepancy) is 0.00. The geodesic discrepancy (d_G) is 0.00. The Normed Fit Index (NFI) is 1.00. All of these indicators demonstrate that the model is acceptable and support the validity of the structural model utilized in this study.

Now that it was found that course satisfaction mediates the role of efficacy on reading comprehension, it may be worthwhile to see which components of satisfaction, namely, the interaction between students and faculty (hereafter interaction), content relevance (hereafter, content) and teaching/delivery (hereafter, teaching) have a greater role in reading comprehension performance. To achieve this, the following model, illustrated in Figure 3, was tested.

Figure 3 shows that 0.19% of the variance in reading comprehension is substantiated by the interaction, the relevance of the content, and the teaching system. The path coefficients showed 0.03 %, 0.22%, and 0.19% direct effects of interaction, content and teaching on reading comprehension, respectively. Furthermore, the path coefficients showed a 0.51% effect of content relevance on teaching, a 0.44% effect of interaction on teaching, and a 0.85% effect of interaction on content. Since the observed coefficients are all greater than 0.20, they are statistically significant (Wong, 2019). The bootstrapping procedure was used to check the structural paths' significance. T values for the relationship between interaction, content, teaching and reading comprehension are 0.31, 1.65 and 1.79, respectively. Following Wong's threshold (2019), no significant direct relationship between these variables was observed. However, 0.72 percent of content variation was justified by interaction and 0.85 percent of teaching variation was explained jointly by interaction and content.

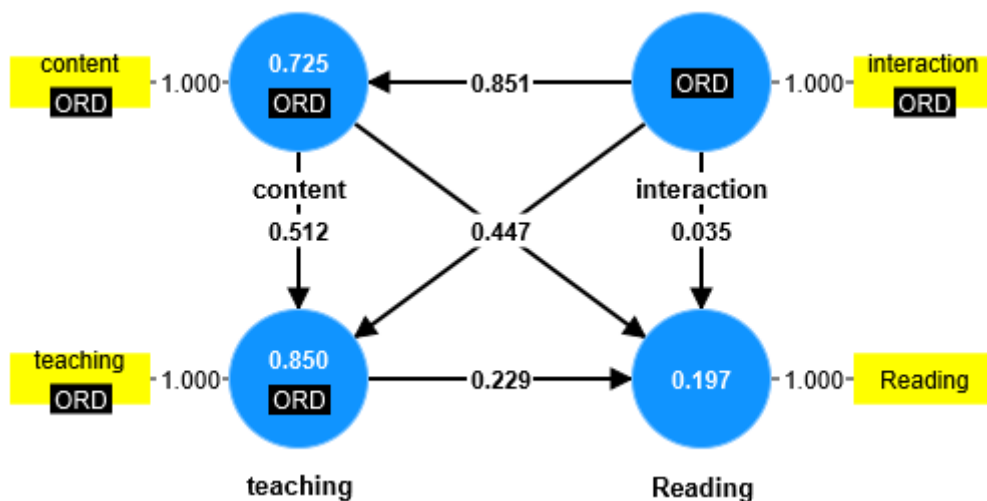


Fig. 3 The structural model of the relationship between interaction, content, teaching and reading comprehension

Table 4 reveals that the total effect of content on reading comprehension is 0.31% ($P=0.00$), of which 0.11% is indirect. In other words, the direct effect of content on reading comprehension is 0.20%. The total effect of interaction on reading comprehension is 0.40 ($P=0.00$) of which 0.36% is indirect, i.e., 0.16% via content, 0.10% via teaching and 0.10% via a combination of content and teaching. Therefore, the influence of interaction on reading comprehension is mediated by both the relevance of the content and the teaching system utilized. This suggests that the most effective way to improve reading comprehension is by providing students with relevant content and teaching them how to interact with the content of the course. This can be done through a combination of teaching strategies and content-specific instruction.

Table 4

Effects of interaction, content and teaching on reading comprehension

Variables Relationship	Total effects	Indirect effect	f-square (effect-size)
Content -> Reading	0.31($P=0.00$)	0.11($P=0.08$)	
Content -> Teaching	0.51($P= 0.00$)		0.48
Interaction -> Reading	0.40($P=0.00$)	0.36($P= 0.00$)	
Interaction -> Content-> Teaching		0.43($P=0.00$)	
Interaction-> Content-> Reading		0.16($P=0.10$)	
Interaction->Teaching-> Reading		0.10($P=0.07$)	
Content -> Teaching-> Reading		0.11($P= 0.08$)	
Interaction->Content-> Teaching->Reading		0.10($P=0.08$)	

interaction -> content	
interaction -> teaching	2.63
	0.36

Using the f-square index, the researcher found that the effect size of the content on teaching (0.48), interaction on content (2.63), and interaction on teaching was 0.36, which are very large effects. See Cohen (1988) for information regarding threshold values.

5. Discussion

As previously noted, students satisfied with their online courses tend to perform better academically (Chang & Smith, 2008; Marks et al., 2005; Moore & Kearsley, 2011; Puzziferro, 2008). Course satisfaction is a key to academic success (Chang & Smith, 2008; Marks et al., 2005). The significantly positive correlation observed between self-efficacy and reading comprehension is consistent with the findings of Alqurashi (2016), Gebara (2010) and Xiao (2012). Self-efficacy in using a computer and its association with learner satisfaction has been the subject of much research. In blended e-learning settings, Wu et al. (2010) and Prifti (2022) concluded that computer self-efficacy did not impact student satisfaction significantly. It was found by Jan (2015) that student satisfaction and computer self-efficacy do not correlate significantly. Our findings, however, are consistent with those of Artino (2007), who asserts that course satisfaction is significantly correlated with computer self-efficacy.

The outcomes of this study point out the pivotal role of course satisfaction in mediating the effect of self-efficacy on reading comprehension, in line with existing research emphasizing satisfaction as a determining factor of

academic success in online learning environments (Gopal et al., 2021; Alqurashi, 2018). Specifically, it was shown that while self-efficacy alone has a minor direct effect on reading comprehension, the mediating influence of course satisfaction significantly enhances this relationship, thus corroborating previous studies on the indirect effect of self-efficacy on learning outcomes (Hammouri & Abu-Shanab, 2018; Zimmerman & Kulikowich, 2016).

The reviewed literature shows that students' self-efficacy impacts their learning behaviors and academic persistence, particularly in online instruction where learner independence and digital literacy are crucial (Martin et al., 2022; Dinh et al., 2022). This study adds to this knowledge by showing that self-efficacy significantly influences course satisfaction, which in turn boosts reading comprehension. This highlights the need to enhance both self-efficacy and satisfaction to improve academic outcomes, as noted by Kuo et al. (2014) and Richardson & Swan (2019).

The strong correlation between self-efficacy and course satisfaction aligns with Bandura's theory of self-efficacy, which highlights the importance of confidence in task execution and success (Bandura, 1977). High self-efficacy motivates students to actively engage with course materials and view challenges as growth opportunities, boosting satisfaction and academic performance (Wang & Sun, 2020). This study shows that confidence in online learning significantly enhances course satisfaction, leading to improved reading comprehension.

This study showed that student and faculty interaction could affect reading comprehension in a statistically significant manner. This finding led the researcher to understand that online interaction contributes to learners' satisfaction and learning. Our findings corroborate previous reports. For example, Kuo, et al. (2014) observed that the most important performance indicator for online courses was student-teacher interaction. Sebastianelli et al. (2015) observed

that only course content could significantly predict learning. The interaction would create meaningful learning. This aligns with research suggesting that meaningful communication and social presence are essential for student satisfaction (Richardson et al., 2022). Interaction promotes a sense of belonging and engagement, which are critical for students to succeed in an online setting (Ong & Quek, 2023).

This study confirms previous research on the value of interaction (Kuo et al., 2014) and highlights the usefulness of collaboration between learners and teachers. Artino (2009) noticed that interactions with teachers have a great role in learners' satisfaction and achievement in online instruction. We concur with Gray and DiLoreto (2016), who observed that student-teacher communication reduces students' perception of separation between them and their teachers. Furthermore, communication can lead learners to experience constructive emotions, for example, relief, satisfaction and excitement that help achieve educational goals.

Prior studies have revealed that interactive styles of teaching and high levels of interaction between teachers and learners are strongly associated with high satisfaction and learning outcomes (Arbaugh, 2001; Siddig & Al Khoudary, 2018). Johnson and Johnson (1999) showed that a high degree of interaction and collaboration with professors and other students can be a strong motivation for learning. Yang (2023) also observed that high levels of interaction and collaboration with professors and other students can significantly motivate learning.

It was also concluded that content relevance, as well as learner-teacher interaction, acted as an intermediary between computer self-efficacy and reading comprehension. In a similar fashion to Kuo et al. (2013), online

students are inclined to engage consciously with course content related to their classroom performance. Innovations in web technology continue to influence online courses and interactions. It is believed that student satisfaction directly impacts their perception of interactions (Bağrıacık Yılmaz, 2023; Drouin, 2008).

Readers may easily agree that online and face-to-face classes are distinct. Teachers moving to an online class can face difficulties. To accommodate the demands of students in online classes, instructors need to qualify themselves for the new setting (Hollister et al., 2022; Varvel, 2007). In online programs, some students may feel uneasy due to the lack of direct contact. Therefore, student-faculty communication in an online class is essential. Such collaboration can be improved with regular communication and feedback.

In an online learning setting, educators can adapt a range of teaching materials utilizing technology to enable students to deal with the course. This strategy includes using computer-based multimedia content, reading interactive texts, self-study materials and watching videos (Haleem et al., 2022). When students have frequent, high-quality interactions with their teachers, they are more likely to be satisfied and learn more effectively. Interactions comprise getting feedback, taking part in online conversations, requesting information, etc.

6. Conclusion

Findings from this study show that online self-efficacy mediated by student satisfaction explains reading achievement among Iranian university students. The results indicate that while online learning self-efficacy is an important predictor of students' engagement, course satisfaction has a more significant direct impact on reading comprehension outcomes.

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To improve the quality of online education, educators and policymakers should focus on key aspects of online instruction such as interaction, content relevance, and teaching delivery. Enhancing these components can lead to greater course satisfaction and better learning outcomes. Offering training that boosts students' digital literacy and technological skills will help build confidence and self-efficacy. Additionally, fostering regular, meaningful interaction between students and teachers creates a supportive learning environment that promotes understanding and increases overall satisfaction.

However, web-based learning systems are still in the premature stages of implementation, observation, and investigation. Developing online learning systems that facilitate student participation and interaction can be a challenging task, and many factors may affect a program's success or failure. It is crucial to explore the potential of online learning systems and develop strategies for their effective implementation in education. Future research should also investigate how online learning self-efficacy impacts other areas of student learning.

This study intended to see how online learning self-efficacy and course satisfaction predict reading performance in an online learning environment, but some limitations should be noted. One of the drawbacks is that students must self-report their perceptions of satisfaction and efficacy. Other investigative methods, such as observation or interview, may be used for further research. Additionally, the study focused on a single course, which may not be representative of the online learning mode of instruction as a whole.

This study concentrated on a fully online course. Therefore, the results here may only be valid in completely online learning settings. In other learning environments, including blended learning, students may interact

differently with instructors, fellow students, and course materials. Future studies may consider comparing full online courses with hybrid online courses to see if outcomes change. Additionally, further research should explore the outcomes of different course delivery methods on student performance and engagement. Researchers should also study the function of technology in creating a positive learning experience. Moreover, educators should consider the benefits of different course delivery methods and how they can be used to best support student learning.

Future researchers could explore other factors contributing to online learning satisfaction and performance, such as cultural aspects, individual learning preferences, and institutional support mechanisms. Addressing these aspects can help provide a more subtle understanding of how to efficiently design and implement online education that caters to diverse learners' needs, ensuring that both academic and personal growth objectives are met in online environments.

The study's limitations should be noted. Data collection relied solely on students' self-reports of satisfaction and self-efficacy, which could introduce bias. Future research could include objective measures like performance metrics and observational data to gain a more comprehensive understanding of factors affecting online learning outcomes.

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