Perceived satisfaction and effectiveness of online education during the COVID-19 pandemic: the moderating effect of academic self-efficacy

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ABSTRACT
The purpose of this study is to investigate the characteristics influencing students’ satisfaction with online learning and their efficacy in online courses during the COVID–19 pandemic period. Furthermore, it examined whether there was a moderating of academic self-efficacy on perceived satisfaction and effectiveness of online education. The data for the study were obtained using an online survey from 319 respondents who were studying at any education level. The results indicate that instructor quality, course design, quick feedback, and students’ expectations strongly relate to perceived satisfaction. In addition, quick feedback and students’ expectations strongly relate to the effectiveness of online education, while course design and instructor’s prompt feedback are factors that have no relationship to students’ effectiveness in online education. Academic self-efficacy moderates the relationship between perceived satisfaction and effectiveness of online education paths. This paper builds a model to find the relationship between instructor quality, course design, prompt feedback, and student expectations, perceived satisfaction, effectiveness of online education. Furthermore, the moderate effect of academic self-efficacy in regulating the link between perceived satisfaction and online learning efficacy is proposed in this study. These results are most consistent with the earlier studies that investigated such variables throughout the background of social comparison.

Introduction
The World Health Organization (WHO) proclaimed the virus an international public health emergency and a pandemic (WHO, 2020). As a result, it led in the suspension of courses for students from more than 60 nations, causing schools in these countries and areas to interrupt their original teaching plans (Wang, Han, Liu, & Xu, 2021). Vietnam has verified 174,461 instances of COVID-19 as of 4 August 2021, with 2,071 cases (Briefing, 2021). Aside from the detrimental effects on the national health system and economy, social distance has shifted the way people study and work toward virtualization, resulting in a total shift in Vietnam’s teaching and learning activities (Dinh & Nguyen, 2020). It has resulted in significant school and college closures throughout the...
world (Gopal, Singh, & Aggarwal, 2021). Bridge (2020) said that in order to prevent a strain during the pandemic season, schools and institutions are turning toward educational technology for student learning. Moreover, to avoid huge meetings and crowds, social education has switched from face-to-face to online for preventing the virus from spreading. The development of online learning environments inside those schools hastened, ensuring that learning was not disturbed. Thus, online education has become an essential strategy for restoring the usual teaching sequence (Chen et al., 2020). Argentina, Croatia, China, Cyprus, Egypt, France, Greece, Italy, Japan, Mexico, Portugal, Republic of Korea, Saudi Arabia, United Arab Emirates, Vietnam and the United States are among the nations that use the internet and provide online venues for continuing education. In addition, Viettel Study, VNPT e-learning, Topica, and Hochmai are among the most popular online training platforms in Vietnam (Pham, Nguyen, & Duong, 2020). However, both professors and students find online education to be unusual and confusing (Dinh & Nguyen, 2020). It was difficult for professors and students to register, administer, and preserve the confidentiality of many accounts for various online courses on different platforms. However, in the peak of COVID 19 pandemic, e-learning is not an option, it is a necessity (Maheshwari, Gupta, & Goyal, 2021). Only one-third of learners had any experience with online learning before the COVID-19 outbreak, according to a poll done in Vietnam (B and Company, 2020).

In particular, teachers and students encountered a variety of technology issues, such as late check-in, lost connections, low-quality sound, and so on, all of which had a detrimental influence on student engagement and teaching quality (Lee, Jobe, Mathis, & Gibbons, 2020). Besides, teachers were having difficulty adapting their traditional teaching methods, which emphasized teacher–student and student–student interaction, to an online format. Hence, these issues are expected to worsen in social work education, which places a strong emphasis on human contact and group or team-based work (Nguyen & Foster, 2018).

Previously, there were many research articles related to online learning, but few authors emphasized on students’ expectations of online learning courses and effectiveness of online education. Educational professionals and scholars are particularly interested in student expectations and satisfaction with online learning courses. Many comparison studies have been conducted to illustrate the idea, examining whether conventional or face-to-face teaching techniques are more effective or whether online or combination learning is greater. Lockman and Schirmer (2020) showed that students do considerably better in online learning than in traditional learning. Moreover, Henriksen, Creely, and Henderson (2020) discussed the difficulties instructors encounter while transitioning from an offline to an online method of instruction. As another aspect, Gopal et al. (2021) determine the factors that impact students’ satisfaction and performance in online classes during the COVID–19 pandemic term, as well as the connection between these characteristics, namely, Instructor quality, course design, prompt feedback, and student expectations, which all have a good influence on student satisfaction, which in turn has a positive effect on academic performance. For the higher learning education institution in Malaysia, Nordin and Nordin (2020) showed that acceptance, usability, satisfaction, and technical skills play a pivotal role in inspiring online learning effectiveness. In addition, they also found that except for acceptance of online learning, all criteria promote sustained good efficacy. Besides, Wang et al. (2021) argued that
teacher creativity was favorably connected to students’ reported learning outcomes and learning pleasure, whereas instructor performance was adversely related. Students’ reported learning results were favorably connected to instructional assistance, but not directly to their learning pleasure. Moreover, the impact of instructional assistance and instructor creativity on students’ reported learning outcomes and learning pleasure was moderated by their academic self-efficacy.

However, there is a paucity of research on the characteristics that influence students’ satisfaction and performance in online classrooms during the COVID-19 epidemic (Rajabalee & Santally, 2020). Hence, course design, instructor quality, prompt feedback, and students’ expectations are the four most important drivers of online education effectiveness as well as student satisfaction during online sessions, which is proposed in this study. In addition, this study also suggests that perceived satisfaction positively affects effectiveness of online education. Furthermore, it investigated whether there was an effect of academic self-efficacy on the relationship between perceived satisfaction and effectiveness of online education. As a result, it has a wide range of practical consequences for educators, students, and researchers. It also extends the literature by indicating that in the area of internet classes during the COVID-19 epidemic, several factors are responsible for student satisfaction and performance. In this scenario, they would have to adapt to a changing climate, refine their technical abilities along the way, and develop new students’ technical expertise.

**Literature review and hypotheses**

The impact of the COVID-19 epidemic on the education sector has resulted in significant school and college closures throughout the world (Gopal et al., 2021). As a result of the present epidemic, traditional teaching modes are being reformed in such a way that online education has gone from an auxiliary to a primary mode of instruction. The remainder of the article is organized as follows. These are the hypotheses offered by the author.

**Prompt feedback**

Knowing whether the desired objectives have been achieved or not is what prompt feedback entails (Simsek, Turan, & Simsek, 2017). The author also argued that prompt feedback in education may be defined as knowing what you know and what you do not know about learning.

As a result, prompt feedback has the potential to increase the active reciprocal impact between the teacher and the student, resulting in improved student learning (Chang, 2011). Besides, Christensen (2014) also investigated the relationship between feedback and performance and proposed the positivity ratio idea, which is a method that aids in determining performance through feedback. Prompt feedback has been proven to aid in the development of a strong bond between faculty and students, which leads to improved learning outcomes (Simsek et al., 2017). The online formative assessment offers students with the immediate feedback they need to assess their learning and correct instructional and learning flaws (Wang, Wang, Wang, & Huang, 2006). Thus, the main purpose of the feedbacks is to improve student learning (Carless & Boud, 2018) especially prompt...
feedbacks helps students prevent continued incorrect performances and reinforce correct performances (Kim, Yu, Park, Ha, & Baek, 2021). Besides, prompt feedback might help with the interaction between preceptors and students, as well as the transmission and exchange of knowledge (Beard, 2008).

**Quality of instructor**

In online classrooms, the instructor’s quality has a significant impact on student satisfaction (Gopal et al., 2021). Marsh (1987) devised five tools for assessing the quality of an instructor, the most important of which was the Students’ Evaluation of Educational Quality (SEEQ), which defined the instructor’s quality. Students found SEEQ to be a very valuable tool for providing comments on the instructor’s quality (Marsh, 1987), while Hill, Lomas, and MacGregor (2003) discovered that the instructor’s quality, such as lecture delivery, comments to students during meetings and on projects, and classroom interaction was all-important. Moreover, Russ-Eft, Dickison, and Levine (2005) investigated the impact of instructor and instructional material quality on training transfer as evaluated by self-ratings of preparation. According to Otto, Sanfórd, and Ross (2008), the four measures of instructor quality (helpfulness, clarity, and ease) were found to be ‘consistent with our predictions under the assumption that the ratings represented student learning’

**Course design**

Curriculum knowledge, program organization, instructional goals, and course structure are all part of course design (Wright, 2003). It might be interpreted as a student’s internal dialogue to absorb course content (Moore, Dickson-Deane, & Galyen, 2011). Students engage with course material to gain information and knowledge (Kuo, Walker, Belland, & Schroder, 2013). According to Kuo et al. (2013), a strong course design ensures that course content is provided in a well-organized manner that is easy to access by students. Besides, effective course design, according to Mtebe and Raisamo (2014), will aid in the improvement of learners’ performance by enhancing their knowledge and abilities (Khan & Yildiz, 2020; Mohammed, Suleyman, & Taylan, 2020). Moreover, course design may improve students’ satisfaction with the system when it is well (Almaiah & Almulhem, 2018). If the course is well-designed, students will be more appreciative of the e-learning system, and their satisfaction is high as well (Mtebe & Raisamo, 2014). However, if the course is not well-designed, teachers and students may be less likely to use e-learning platforms (Almaiah & Almulhem, 2018).

**Students’ expectation**

Each individual has expectations about how other people behave during interpersonal encounters (Burgoon, Le Poire, & Rosenthal, 1995). According to Chatfield (1987), expectations “is developed on the basis of prior experiences with the same or comparable events, comments made by friends and other colleagues, and statements made by the providing organization”. Moreover, Appleton-Knapp and
Krentler (2006) found out the influence of students’ expectations on their performance, while King, Boyatt, and Russell (2014) showed that student expectations as a factor that influenced their adoption of e-learning. When a behavior fails to fulfill expectations, this is less satisfying (Koermer & Petelle, 1991). Hence, understanding students’ expectations and needs, as demonstrated by Henry (2020), allows institutions to create programs that satisfy these needs while also empowering students to attain good outcomes. If students’ experiences are seen to have met their expectations, they are more likely to be satisfied and continue their studies, and vice versa (Wu, Tsai, Chen, & Wu, 2006).

**Students’ academic self-efficacy as a moderator**

Self-efficacy relates to one’s conviction in one’s ability to execute or learn in a certain endeavor, as defined by Bandura’s (1997) social cognitive theory. Academic self-efficacy, also known as self-efficacy in the conventional learning environment, has been broadly described as one’s conviction in one’s confidence and ability to effectively complete a given learning activity in an educational context (Bandura, 1986). Kandemir (2014) also defined academic self-efficacy as an individual’s confidence in achieving academic achievement. Güvercin, Tekkaya, and Sungur (2010) showed that students’ academic self-efficacy in science decreases with age, while gender disparities in academic self-efficacy grow with age (Huang, 2013). Self-efficacy was shown to be adversely proportional in 29% of pupils with high stress levels (Navarro-Mateu, L, T, Prado-Gascó, & Valero-Moreno, 2020). Academic self-positive efficacy’s impact on students’ learning performance and satisfaction has been thoroughly studied, and the findings suggest that academic self-efficacy could be a correlational, or moderating factor, stating the relationship between academic self-efficacy and university students’ academic performance (Honicke & Broadbent, 2016). As a result, the link between academic self-efficacy and student achievement in online learning contexts is still up for debate (Tsai, Chuang, Liang, & Tsai, 2011).

**Hypothesis** Several factors influence student perceptions of satisfaction (Xiao & Wilkins, 2015). To begin with, instructors should be aware of design features that enhance student success and satisfaction, such as course alignment and content integration with technology to increase engagement (Kauffman, 2015). Munteanu, Ceobanu, Bobâlcă, and Anton (2010) found that instructor quality is one of the most important factors in determining student satisfaction and the success of the educational process. Moreover, Pham, Williamson, and Berry (2018) showed that overall e-learning service quality and e-learning loyalty, as well as e-learning satisfaction and e-learning loyalty, are all positively correlated with e-learning teacher quality. Taghizadeh and Hajhosseini (2021) also confirmed that teaching quality contributed most to online satisfaction, which may be attributed to the instructor’s utilization of relevant online materials, her timeliness and attendance, and her effective student interaction. As a result, the instructor successfully presents the course and influences the students to perform better in their studies, resulting in student satisfaction and improving the learning experience (Ladyshewsky, 2013). In the context of online education in Vietnam, this study contained the premise that the quality of instruction has a major impact on student satisfaction.
**H1a: Quality of Instructor has significant impact on Perceived Satisfaction**

The teacher must consider the course learning outcomes before creating learning activities and lessons that will engage students and encourage engagement (Mehta, Makani-Lim, Rajan, & Easter, 2017). According to Arbaugh (2010), both course design and communication habits are formal and informal predictors of student satisfaction, which Liaw (2008) found out the course’s design impacts students’ learning and satisfaction through influencing their course expectations. Additionally, Jenkins (2015) stated that course design characteristics may be established and used to improve student performance. On the other hand, student satisfaction is directly connected to course design and structure, peer and teacher-student interaction, instructor assistance, timely feedback, specific directions, and the type of student tasks (Vonderwell & Turner, 2005). Thus, the author proposed the hypothesis below:

**H2a: Course Design has significant impact on Perceived Satisfaction**

In online learning, timely response as known ‘prompt feedbacks’ is also necessary to address students’ questions and build their confidence through virtual presence (Faize & Nawaz, 2020). According to Hill et al. (2003), student satisfaction was affected by the performance of instructors and course delivery, the speed of feedback offered to students in courses and on assignments, and the interpersonal relationships between students and lecturers. Dennen, Darabi, and Smith (2007) discovered that prompt feedback is more essential to learners than comprehensive feedback. When students receive feedback quickly, they may either feel confident that they grasp the material well enough or they might ask for help to steer them in the correct way (Kranzow, 2013). On the other hand, when online task feedback is not prompt, organized, practical, and individually tailored in a way that encourages involvement, a negative impact on student satisfaction can occur (Palmer, Holt, & Bray, 2008). Thus, this hypothesis is proposed as below:

**H3a: Instructor’s Prompt Feedback has significant impact on Perceived Satisfaction**

Satisfaction is determined by expectations and perceived performance (Chatfield, 1987). In specific, when students’ perceptions of the online course’s spatiality and temporality aligned with their self-motivation and self-directedness styles, as well as their expectations of peers, they expressed their appreciation and satisfaction (Landrum, Jennifer, Gilbert, Rhame, & Susan, 2020). Thus, the greatest method to enhance student satisfaction is to raise their expectations (Brown, Venkatesh, & Goyal, 2014). Moreover, empowering students to set reasonable expectations from the beginning should improve their overall satisfaction with the course (Appleton-Knapp & Krentler, 2006). As a result, this study contained the premise that the student’s expectations had a major impact on satisfaction.

**H4a: Student’s Expectations has significant impact on Perceived Satisfaction**

In addition, students in online programs can perform more outstandingly than on-campus students, and making the online educational process feasible could benefit both
students and educational institutions (Connolly, MacArthur, Stansfield, & McLesslan, 2007). Learning effectiveness is defined by Liu (2007) as a learner’s acquisition of information, abilities, and attitudes as a result of participating in a learning or training activity. It is a measure of how good people learn; it may be measured by looking at how people behave throughout different stages of learning (Snyder, Raben, Farr, & Farr, 1980), in which, time savings, reduced danger of COVID-19 exposure, participation even while unwell, and continuance of the academic cycle with extra exposure to external faculty’s webinars are all factors that contribute to Online learning efficacy in this context (Kharel, Tripathi, Rayamajhi, & Thapa, 2020). On the other hand, in the context of undergraduate, Chickering and A. G (1987) discovered six principles that influence effective learning namely, student-faculty interaction, academic and non-academic personnel, Promoting student cooperation, Promoting student involvement and active learning, Prompt feedback, Emphasis on task time, and Effective communication of high expectations. Moreover, Gorsky and Blau (2009) also mentioned course design as another principle, which is studying with suitable and various ways of learning. Besides, Zhu (2012) also found that student satisfaction levels should be considered in creating online courses and building online environments, in order to offer students an effective learning environment, while Piccoli, Ahmad, and Ives (2001) identified two variables that contribute to online learning effectiveness: human and design dimensions. Faculty and students are included in the human dimension, which is one of the most essential aspects in effective online education (Martin, Ritzhaupt, Kumar, & Budrani, 2019), whereas technology is referenced in the design dimension, which helps to improve learning and teaching effectiveness through appropriate online learning strategies and skills (Xu, Chen, & Chen, 2020). Russell, Kleiman, Carey, and Douglas (2009) took an example with online math courses, and instructors’ quality and course content was a significant important factor in students’ ability to learn effectively. However, not many prior authors studied in detail that all factors including prompt feedbacks, instructor quality, course design, and student expectations are related to the effectiveness of online education in the context of various levels of education. Furthermore, it is hard to find previous research studies that implied student expectation has a significant correlation with the online education effectiveness. Thus, the author hypothesized that these variables have an impact on the efficacy of online education.

**H1a: Quality of Instructor has significant impact on Effectiveness of Online Education**

**H2a: Course Design has significant impact on Effectiveness of Online Education**

**H3a: Instructor’s Prompt Feedback has significant impact on Effectiveness of Online Education**

**H4a: Student’s Expectations have a significant impact on Effectiveness of Online Education**

Biner et al. (1996) discovered that a student’s satisfaction with a tele course predicts their overall class performance. Dissatisfied students are more driven and devoted to their studies, and as a result, they are better learners than their dissatisfied peers (Biner, Dean, & Mellinger, 1994). Besides, for students at higher education institutions, satisfaction,
usability, and technical skills are all positively connected to the efficacy of online learning (Nordin & Nordin, 2020). Previous research has focused on how multimedia instruction, interactive learning activities, and the quality of the e-learning system may improve e-learning efficacy (Liaw, 2008). However, any studies have found a direct relationship of perceived satisfaction to effectiveness of online education in the context of diverse educational levels in Vietnam. As a result, whether students perceive satisfaction with an online course will increase the effectiveness of online learning. This study contained the hypothesis that perceived pleasure has a substantial impact on the effectiveness of online education.

**H5: Perceived satisfaction has a significant impact on effectiveness of online education**

Self-efficacy, a fundamental component of social cognition theory, has regularly been shown to be a substantial contributor to students’ learning results (Schunk & Pajares, 2009). It depicts students’ expectations on their ability to succeed in the classroom (Bandura, 1997). In which, individuals with poor self-efficacy may have doubts about their capacity to evaluate data and feedback correctly (Piccoli et al., 2001). According to Tsai and Tsai (2003), higher self-efficacy might help students develop better behavioral, procedural, and cognitive methods for finding information. Students with high academic efficacy may gain more from their information-gathering activities because they are more engaged and less distracted with their academic duties, allowing them to perform better (Zhu, Chen, Chen, & Chern, 2011). On the other hand, academic self-efficacy was found to have no relationship with students’ performance in an online education environment (Yukseturk & Bulut, 2007). Furthermore, academic self-efficacy was found to be moderately associated with academic performance (Honicke & Broadbent, 2016). Based on the aforementioned literature, this study aimed at the moderator effect of academic self-efficacy within the relationship between effectiveness of online education and perceived satisfaction. Thus, the author proposed the hypothesis below to test the moderate effects:

**H6: Academic Self-Efficacy has moderator effect between Effectiveness of Online Education and Perceived Satisfaction.**

**Methodology**

**Research framework**

COVID-19’s global expansion resulted in the interruption of classrooms for over 850 million children throughout the world, upsetting schools’ original teaching plans in various nations and areas (Chen et al., 2020). Distance learning is neccessary for instructors and learners to solve the problems causing by COVID-19 pandemic. The data research was performed in two steps including the pilot and official collecting. Prior to the official collecting data, the questionnaire was pilot tested over the course of two days with a sample of 10 experts in the education field. The main objective of the pilot test was to identify questions that needed improvement in terms of language, relevancy, terseness, and applicability (Buschle, Reiter, & Bethmann, 2022). Mercifully, there were no issues
with the questionnaire’s acceptability or the items’ clarity. Through social networking sites like Zalo, Facebook, and Gmail, this study gathered online responses from Vietnamese students at any level of education regarding the online learning. From the previous arguments, this study finds out whether factors such as instructor quality, prompt feedbacks, student expectation and course design have any relationship in both perceived satisfaction and effectiveness of online learning. Moreover, the model with the moderator variable ‘Academic Self-Efficacy’ is extremely distinctive, and it aids in a better understanding of the link between online education perceptions and satisfaction and effectiveness. As a consequence of the literature study, the author came up with the comprehensive framework in Figure 1.

**Questionnaire design**

There were two sections to the survey questionnaire. The first section dealt with demographic factors such as occupation, gender, age groups, and educational attainment. The second section assessed seven factors including instructors quality, course design, quick feedback, student expectations, perceived satisfaction, effectiveness of online education, and a moderator variable ‘Academic Self-Efficacy’. To address the research question, participants were asked to complete a total of 36 questions in the study to check the effect between these variables on which means it has a 36-item scale. In order to measure quality of instructor, modified seven items of scale were developed by Bangert (2004) and were modified by Gopal et al. (2021). Moreover, six items of scale ‘course design’ were based on the research of Bangert (2004). Moreover, four items of ‘prompt feedback’ were also inspired from the study by Bangert (2004). In addition, Bangert (2004) and Wilson, Lizzio, and Ramsden (1997) devised a five-item scale to evaluate students’ expectations, while perceived student expectation was assessed by Allen and Seaman (2011) and Gopal et al. (2021) through seven items. The ‘Effectiveness of Online Education’ was assessed using the Nordin and Nordin (2020) scale with five item-scale. Finally, the moderator variables were investigated based on the study by Wang et al. (2021), which contains three items. In addition, a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was accessibility used in this study. Moreover, a descriptive research design was adopted in this study, in which independent variables
included ‘instructor quality, course design, prompt feedback, and students’ expectations,’ while the current study’s dependent variables were the effectiveness of online education and perceived satisfaction. Moreover, the ‘academic self-efficacy’ variable played a moderator role.

**Demographic statistics**

The data for this cross-sectional survey were obtained from 350 respondents who were studying at any level of education. However, there were 319 valid responses, with 31 unaccepted responses eliminated since they did not accurately answer the reversed scale questions. Furthermore, the information was gathered during the COVID-19 period in Vietnam, when all most cities were under lockdown. Demographic images were collected, which were quite balance between these detailed groups, which helped make this study highly representative. Table 1 shows demographic statistics of this research.

**Confirmatory factor analysis (CFA)**

Confirmatory factor analysis (CFA) is a multivariate method for evaluating reliability and validity (1996) that uses empirical data to confirm a theoretical model (SEM; Alavi et al., 2020). The hypothesized factor structure is then used to assess how much of the covariance between the items may be recorded (Hooper, Coughlan, & Mullen, 2008). The measurement model’s results also revealed acceptable model fit indices, indicating that Chi-square/df (cmin/df) = 2.269; Goodness of fit index (GFI) = 0.917, Adjusted goodness of fit index (AGFI) = 0.783, Comparative fit index (CFI) = 0.814, Root mean squared error of approximation (RMSEM) = 0.063, Tucker Lewis Index (TLI) = 0.909, Tucker Lewis Index (TLI) = 0.923, and Tucker Lewis Index (TLI) = 0.9. Table 2 presents these indexes:

| Category                          | Number of respondents | Percentage |
|-----------------------------------|-----------------------|------------|
| **Gender**                        |                       |            |
| Male                              | 150                   | 47%        |
| Female                            | 169                   | 53%        |
| **Age**                           |                       |            |
| Less than 18                      | 115                   | 36%        |
| 18–25                             | 150                   | 47%        |
| 25–30                             | 54                    | 17%        |
| **Year in the program**           |                       |            |
| Year 1                            | 65                    | 20%        |
| Year 2                            | 94                    | 30%        |
| Year 3                            | 91                    | 29%        |
| Year 4                            | 69                    | 21%        |
| **Devices available at home for internet** | | |
| Desktop computer                  | 29                    | 9%         |
| Laptop                            | 116                   | 36%        |
| Smartphone                        | 94                    | 30%        |
| Tablet                            | 80                    | 25%        |
Table 2. Confirmatory factor analysis.

| Measure                              | Threshold                        | Present study results | Source                                      |
|--------------------------------------|----------------------------------|-----------------------|---------------------------------------------|
| Chi-square/df (cmin/df)              | $\leq 2$ good; $\leq$ sometimes permissible | 2.269                 | Hair, Black, Babin, Anderson, & Tatham, 2009 |
| Goodness of fit index (GFI)          | $\geq 0.9$: acceptable; $\geq 0.8$: marginal | 0.917                 | Hair et al., 2009                          |
| Adjusted goodness of fit index (AGFI)| $\geq 0.8$                        | 0.873                 | Hair et al., 2009                          |
| Comparative fit index (CFI)          | $\geq 0.95$ great; $\geq 0.90$ traditional; $\geq 0.80$ sometimes permissible | 0.814                 | Hair et al., 2009                          |
| Root mean squared error of approximation (RMSEM) | $\leq 0.05$ good; $\leq 0.08$ moderate | 0.063                 | Hair et al., 2009                          |
| Tucker Lewis Index (TLI)             | $\geq 0.90$                       | 0.909                 | Hair et al., 2009                          |

Construct Validity

The reliability of all the variables including quality of instructor, course design, instructor’s prompt feedback, student’s expectation, perceived satisfaction, effectiveness of online education, and academic self-efficacy was in the range of 0.823 to 0.943 (Table 3). The results of the reliability tests were acceptable.

The factor loading of the majority of items should be greater than 0.5 (Hair et al., 2009). However, there is 1 item of Instructor’s Prompt (IP) is rejected, which is less than 0.5. All average variance extracted (AVE) values were greater than the threshold level of 0.50, ranging between 0.538 and 0.782. As a result, the variance explained by the variables’ measurement items was more than the variance caused by measurement error (Fornell & Larcker, 1981), showing that the constructs had strong convergent validity. The composite reliability coefficients varied from 0.778 to 0.942, showing that all of the constructs were internally consistent to a high degree (Fornell & Larcker, 1981). As a result, the outcomes were satisfactory (Table 3).

The square root of AVE of a latent construct was compared to all the construct correlations to see if discriminant validity exists. The results showed that the inter-construct correlations were higher than the square of AVE values of all the variables, including instructor quality, course design, instructor prompt feedback, student expectation, perceived satisfaction, effectiveness of online education, and academic self-efficacy (Table 3). As a result, the outcomes were appropriate (Hair et al., 2009).

Hypothesis testing

The associations between the variables were investigated using structural equation modeling analysis with AMOS 22.0 (Wang et al., 2021). The structural equation modeling technique was utilized to investigate the stated hypothesis. When CMIN/DF was 2.463, the structural model’s model fitness indicators include all variables. Furthermore, all the model fit values were inside the specified range, indicating that the model had a satisfactory model fit. N = 319, CFI = 0.911, GFI = 0.809, RMSEA = 0.068, and TLI = 0.903 were some of the other fit indices. As a result, the model was able to properly fit the data.
The result supposed that the quality of the teachers had a significant association with perceived satisfaction in online course ($\beta = 0.345, p < .001$). Thus, H1a was supported. Furthermore, supporting H2a ($\beta = 0.28, p < .001$), which was course design had a significant correlation with perceived satisfaction. However, H3a was unsupported in
Figure 2. The result of the model assessment.

this research since the instructor’s prompt had no substantial positive impact on perceived satisfaction ($\beta = 0.096$). In addition, student’s expectations ($\beta = 0.090, p < .01$) also had a significant, positive impact on student’s expectations. Thus, H4a was also supported (see Figure 2).

Moreover, quality of instructor ($\beta = 0.282, p < .001$) and instructor’s prompt ($\beta = 0.175, p < .001$) had a significantly positive relation to effectiveness of online education. Hence, H1b and H3b were supported, while the study found a relationship between student’s expectations and effectiveness of online education ($\beta = 0.087, p < .001$), so H4b was supported. However, there was no relationship between course design and effectiveness of online education ($\beta = -0.042$), H2b was unsupported. Finally, H5 was supported, which confirms the positive relationship between perceived satisfaction and effectiveness of online education ($\beta = 0.311, p < .001$). Table 5 presents clearly the results. Besides, the Table 4 shows discriminant validity.

**Moderation results**

The moderator impact of student’s academic self-efficacy on the connections between these dependent variables, namely, students’ perceived satisfaction and effectiveness of online education, was estimated using AMOS 22.0 using 319 bootstrap samples. According to the academic self-efficacy moderating effect, there was also a significant interaction effect of perceived satisfaction and academic self-efficacy on the effectiveness

| Hypotheses | Path      | Standardized path coefficient | Result     |
|------------|-----------|------------------------------|------------|
| H1a        | QIO → EOE | 0.345***                    | Support    |
| H1b        | QIO → EOE | 0.282***                    | support    |
| H2a        | IPO → EOE | 0.090**                     | Supported  |
| H2b        | IPO → EOE | 0.175***                    | Support    |
| H3a        | IPO → EOE | 0.096                        | Unsupported |
| H3b        | IPO → EOE | -0.042                     | Unsupported |
| H4a        | SEO → EOE | 0.087**                     | Support    |
| H4b        | SEO → EOE | 0.311***                    | Support    |

Note. $N = 319, \cdot p < .05; **p < .01; ***p < .001.$
of online education with $\beta = 0.209$, $p < 0.001$, confirming H6. It revealed that the conditional indirect effect of academic self-efficacy in the analysis of perceived satisfaction regressed on the effectiveness of online education x academic self-efficacy significance. Thus, the findings confirmed our hypothesis for the moderated model. Figure 3 shows the relationship between perceived satisfaction and effectiveness of online education, which was positive for both the levels of self-efficacy, much stronger when the self-efficacy was higher. This indicated that self-efficacy enhanced the strength of the satisfaction-effectiveness in the research model. The result is shown in Figure 3.

**Discussion**

COVID-19’s global expansion caused the disruption of courses for over 850 million students throughout the world, as well as extensive school and institution closures (Gopal et al., 2021). Thus, a rapid transition from face-to-face classroom instruction to online forms might have an impact on class learning efficacy (Janmaimool & Nunsunanon, 2021). Many previous studies have looked at the elements that influence student satisfaction and the effectiveness of online learning such as Gopal et al. (2021); Nordin and Nordin (2020); Simsek et al. (2017); but no author found out that many factors from different aspects such as instructor quality, prompt feedbacks, student expectation, and course design are related to perceived satisfaction and effective online learning. Based on the objectives of research, the relationship of the factors (course design, instructors
quality, prompt feedbacks, and student expectation) and perceived satisfaction is investigated. It also explored that these mentioned factors have significantly positive impacts on the online learning effectiveness. Thus, this research was designed to examine ten hypotheses, in which there was one hypothesis proposed for testing the moderating effect.

First, the instructor’s quality and course design was found to have a positive relationship with perceived student satisfaction. They said that the quality of the teacher and the course design are influential factors that influence student satisfaction. Furthermore, Gopal et al. (2021) showed that an instructor who has to understand students’ psychology in order to communicate the course information prominently is extremely effective during online lectures. Moreover, when teachers communicated well, their actions matched student expectations, and students were more satisfied with the training (Bourdeaux & Schoenack, 2016). While appropriate course/instructional design is equally important, instructors should consider these qualities while designing courses (Cercone, 2008). However, Allen and Seaman (2011) argued that perceived student satisfaction was the same in both online and face-to-face formats. In terms of course alignment and optimising learning, Blumberg (2009) suggested that instructors created objectives based on learning taxonomies (Anderson & Krathwohl, 2001) and matched the teaching, learning, and assessment activities with the objectives. Furthermore, this study also supports the results of Gopal et al. (2021) and Liaw (2008), which found a relationship between student’s expectation and perceived satisfaction. Thus, students’ expectations for the online course have an significant impact on their learning and satisfaction. It can be said that in order to increase the perceived satisfaction, it is necessary for educational institution and instructors to meet the expectations of the students when conducting online courses. However, prompt feedback has a positive impact on perceived satisfactions, which is not supported in the Vietnam online education context. This is in contrast to some previous research studies, which are Gopal et al. (2021) and Simsek et al. (2017). In this study, most of the Vietnamese students participating in this research said that when they received prompt feedback, it does not mean that they will be satisfied by the online course that they attend in COVID-19 period. Although students were aware that providing prompt feedback was necessary and had an impact on their satisfaction in the normal context as the finding of Sun and Chen (2016); however, during the time of the COVID-19 epidemic in Vietnam, both teachers and students understood each other to overcome the most stressful background.

However, research on factors affecting the effectiveness of online learning is complex and unclear. This recent study contributed to earlier findings that human factors including instructors’ quality, students’ expectations have significantly influenced the effectiveness of online learning. This means that satisfaction of students with their instructors helps to increase their efficiency in learning in an online environment. Furthermore, if the educational institutions are able to satisfy students’ expectations, that will also raise the efficiency when studying online. According to Astleitner (2000), learners’ interactions with instructors and students can help them learn more successfully since they can interchange messages and ideas, helping them to create a correct understanding of the subject together. Moreover, Kyei-Blankson, Ntuli, & Donnelly, (2019) also pointed that based on the design, organization, facilitation of discourse, and direct instruction offered by the instructor, student engagement with the instructor helps to
develop perceptions of the teacher’s teaching presence. Thus, instructor quality (including master in knowledge, prompt interaction assisting their students (Voss, Gruber, & Reppel, 2010) may be seen to be the beneficial factor to success in online learning. Moreover, this study also found instructors’ prompt feedbacks will increase the effectiveness of learning in the online environment, which is in line with the outcomes of Simsek et al. (2017). Thus, the results of this study are completely reasonable, because when students cannot detect their faults or grasp what they are doing well without feedback, thus it is critical for students to receive feedback in order to identify their flaws and appreciate their strengths (Mehall, 2020). However, this study did not explore a link between course design and learning effectiveness. Online course design must give key elements such as course material, educational goals, course structure, and course output in a consistent manner for students to see the efficiency of e-learning (Almaiah & Almulhem, 2018). Besides, the relationship between perceived satisfaction and the efficiency of online learning is significant positive. As a result, in the context of Vietnam, perceived satisfaction is critical in motivating online learning efficacy.

The current study also looked at the distinctive characteristic of academic self-efficacy in the direct and indirect relationships between perceived satisfaction and online learning efficacy. Drawing on our findings, it can be inferred that high academic self-efficacy among students is the positive consequence of perceived satisfaction and the resultant effectiveness of online education on their study. This implies that students who have higher academic self-efficacy have a stronger sense of satisfaction and efficacy with the teaching and learning process.

**Conclusion**

The COVID-19 epidemic continues to have an influence on educational organizations’ learning and teaching operations in 2021, and many educational institutions have adopted online instruction from 2019 to 2021 (Janmaimool & Nunsunananon, 2021). Bridge (2020) said that, in order to prevent a strain during the pandemic season, schools and institutions are turning toward educational technology for student learning. Therefore, this article builds a model to find the relationship between the following factors, namely, instructor quality, course design, prompt feedback, and student expectations, perceived satisfaction, and effectiveness of online education. Furthermore, the moderate effect of academic self-efficacy in regulating the link between perceived satisfaction and online learning efficacy was proposed in this study. These results are most consistent with the earlier studies that investigated such variables throughout the background of social comparison. However, this study is not parallel with the research by Almaiah & Almulhem, 2018 because the findings reject the relationship between a link between course design and learning effectiveness. In addition, instructor’s prompt has no substantial positive impact on perceived satisfaction in e-learning context within losing control because of COVID-19 in Vietnam. Furthermore, there are few previous studies that have investigated the impact of academic self-efficacy as the moderator in the link between online education effectiveness and perceived satisfaction. Thus, this study found out the moderate effect of academic self-efficacy in the relationship between online education effectiveness and perceived satisfaction.
Managerial management

For educators, students, and researchers, the findings of this study have a wide range of practical consequences. It also contributes to the current framework literature by indicating that a variety of influencing factors perceived satisfaction and efficacy of online education in the context of online classrooms during the COVID-19 epidemic in Vietnam. For educational institution especially instructors, providing timely, affordable, and quick support services to learners is beneficial to maintaining learners’ good learning outcomes such as satisfaction and their efficiency in learning. Furthermore, the outcomes of this study benefit schools by showing a realistic approach for accurately identifying students’ perception in the e-learning course within the COVID-19 scenario. Professors have acknowledged that they should do more to meet students’ expectations (Gorgodze, Macharashvili, & Kamladze, 2020). Futhermore, online course design will have to dive further into how to arrange online courses more effectively, including design characteristics that reduce negative emotion and increase positive emotion, resulting in higher student satisfaction (Martin, Wang, & Sadaf, 2018).

Limitation

The current research has certain limitations. First, the study’s data came just from Vietnamese students and only asking about E-learning in the peak of COVID-19; however, if data were obtained from a variety of nations and in the others timeline, it would provide more comparable findings for understanding the student’s perspective. Moreover, this study is confined to determining the satisfaction and effectiveness of online education from the perspective of students, so instructors’ perspectives can be examined in the future under comparable settings. Furthermore, the data is based on professors’ and learners’ self-reported opinions, which may or may not be true or represent the truth.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Declarations

Author contribution statement: Van Dat Tran conceived and designed the experiments; performed the experiments; analyzed and interpreted the data; contributed reagents, materials, Analysis tools or data; and wrote the paper.

Ethical statement

My research does not use human or animal subjects.

Funding

The authors received no direct funding for this research.
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