

Online Learning Self-efficacy during an Emergent Transition: A Cross-sectional Survey among Undergraduate Students in Saudi Arabia

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ABSTRACT

Introduction: The Coronavirus Disease-2019 (COVID-19) pandemic significantly affected higher education, necessitating a sudden shift to virtual classes in response to COVID-19 restrictions in the Kingdom of Saudi Arabia (KSA). This transition has highlighted the importance of exploring factors that may influence students' Self-Efficacy (SE) in online learning.

Aim: To identify the dimensions of perceived SE in online learning during the COVID-19 pandemic and examine the association between demographic characteristics and SE levels.

Materials and Methods: A cross-sectional, questionnaire-based research design was conducted at the Department of Nursing, University of Tabuk, Tabuk, Saudi Arabia from January 2022 to May 2022, spanning a duration of five months. Data was collected through an online structured questionnaire, which included a demographic section and the Self-Efficacy Questionnaire for Online Learning (SeQoL). A total of 250 complete responses were received. Data analysis was performed using Statistical Package for Social Sciences (SPSS) Version 23.0. Mean and standard deviation were used to identify the mean SE in online learning. The Chi-square (χ^2) test was used to explore the association between SE and demographic variables.

Results: Out of the total 250 students, the majority were females, 184 (76%), with age range of 20-21 years. The study found that nearly half of the participants had a high level of SE (119, 47.6%), one-fourth had moderate SE (64, 25.6%), and 67 (26.8%) had a low SE level. The mean SE in online learning among the students was 150.8 with a Standard Deviation (SD) of 77.43, corresponding to a mean percentage of 60.3%. The sub-sections of the SE scale related to interacting with classmates and instructors scored lower than other sub-sections. The level or year of education ($p < 0.001$), the device used for online learning ($p = 0.031$), previous online education exposure ($p = 0.038$), and hours of online learning ($p = 0.036$) were significantly associated with participants' online SE. However, age ($p = 0.187$) and gender ($p = 0.609$) did not have a significant effect on online SE.

Conclusion: In the present study, the majority of participants exhibited high or moderate SE in online learning. However, one-fourth of them had low SE levels, indicating the need for improvements in the online learning framework at the University of Tabuk. The study recommends enhancing learning support systems, technical support systems, and interaction to develop SE in online learning, thereby improving the overall quality of the online learning experience.

Keywords: Confidence in e-learning, Coronavirus disease-19, Learning support systems

INTRODUCTION

Everyone in the world has been affected by COVID-19 in some way. Higher education was majorly affected by the pandemic during 2020 and 2021. Some educational institutions immediately converted to online learning due to the advantage of technology. Technology played a major role in the switch to online education [1]. Recent advancements have identified ways to improve learning outcomes through online learning. In developed countries, internet-based information technologies and sophisticated Learning Management Systems (LMS) played an important role in the immediate transition of the educational platform. Developing and underdeveloped countries faced real challenges in the educational system during the COVID-19 pandemic [1,2].

Pre-COVID studies reported less significance of virtual learning in education. Dissatisfaction and negative experiences among students were reported [2,3]. Unsuccessful online learning results from a lack of learner trust and gaps in the eLearning system of the organisation [4]. The pandemic led to the implementation of online educational systems without proper preparation. Preliminary studies on online learning during the COVID-19 pandemic showed that students developed mixed feelings about virtual classes and

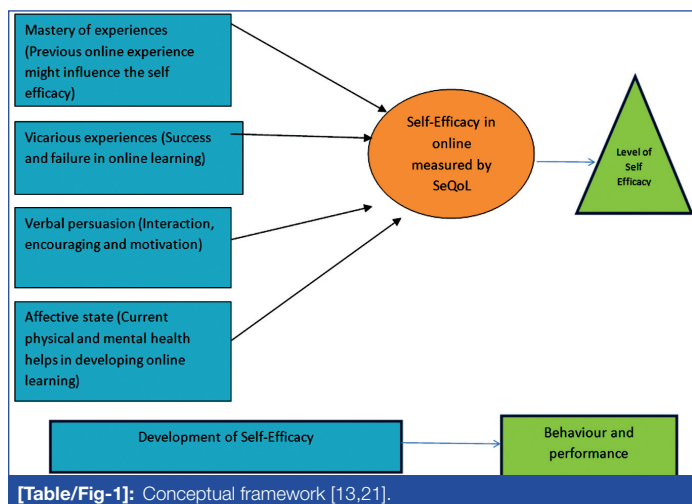
reported low to moderate satisfaction levels with remote/online studies [5,6].

Challenges encountered during the online learning process put students at a greater risk. A Saudi Arabian study revealed that major barriers to using Learning Management System (LMS) were a lack of technical support, negative attitudes towards the technology, and insufficient training [7]. An Indonesian study reported low levels of SE with a high level of psychological stress among students ($p = 0.001$) [8]. Developing SE is one of the greatest interventions to manage these challenges. If the new learning environment is not managed well, it will result in a lack of motivation in academic performance. Perceived SE aids in the acceptance of online learning among students. SE predicts online learning success, readiness, and academic performance [9,10]. Individuals with high SE are reported to have high motivation and better adaptive coping with problems [11]. Even though the current generations are familiar with the latest technologies, the results of online learning SE vary in different research studies [5,6,8]. Exposure to technologies alone is not sufficient for success in online learning. It requires interaction with teachers, peer groups, collaborative work, and proficiency in using the tools in online learning.

The SE is the capacity of an individual to carry out specific academic roles and achieve designated performance in learning situations

[12]. Bandura A defined SE as an individual's belief in their ability to succeed in a given situation and complete a task [13].

Musaka M defines technology SE as a person's belief in their ability to handle technologies to achieve learning outcomes [14]. Academic SE is an influential factor in academic achievement [15]. Online learning SE is a major contributor to academic success and performance [16-18]. Students with high SE are more likely to succeed in tasks with minimal failures, while those with low SE may experience fear and procrastination [19,20]. According to Bandura A, interaction with teachers and peers affects students' academic SE through emotional, cognitive, and environmental stimuli. Four major sources contribute to the formation of SE: mastery of experience, vicarious experience, social persuasion, and physiological and emotional states [Table/Fig-1] [13,21].



[Table/Fig-1]: Conceptual framework [13,21].

The most effective way to build SE is through the mastery of online experiences. Students who do not learn from failures may experience disappointment and difficulties, missing out on opportunities for online learning. Experiencing failure in online learning can contribute to the development of resilience. In the present study, previous online experience represents mastery experience, and present problem-solving techniques are included in SeQoL [13,21]. Vicarious experiences involve developing SE by observing the performance of individuals with similar experiences. Verbal persuasion by influential individuals in one's life helps strengthen SE and is key to success. Affective state refers to emotional reactions in the learning process, as stress reactions can impact individual performance.

Studies on this topic are scarce in KSA [1,4,6,7], especially in Tabuk where no research has investigated the mechanisms of online learning SE. Therefore, there is a need to expand research in this field. The outcomes of the present study would be beneficial for future implementation practices. The overall goal of the study was to identify SE and the factors involved with it. The sudden implementation of distance education due to COVID-19 restrictions in KSA has underscored the importance of exploring factors that may influence students' SE.

MATERIALS AND METHODS

This cross-sectional, questionnaire-based research design was used to investigate the relationship between SE in online learning among undergraduate students at the Department of Nursing, University of Tabuk, Tabuk, Saudi Arabia from January 2022 to May 2022. The research was approved by the Local Research Ethics Committee of the University of Tabuk (UT-202-54-2022). Participants provided their consent, and confidentiality was assured before data collection.

Sample size calculation: The sample size was estimated using a z value of 1.96 with a 95% confidence level and a margin of error of 5%. The estimated proportion (p) for the expected response rate (e.g., 0.80 for 80%) was determined based on response rates

from previous studies [17,22]. The estimated sample size was 246. However, the survey link was sent to 450 participants. A total of 272 responses were received, and 250 complete responses were considered for analysis.

Inclusion criteria: Undergraduate students who had experience in attending online classes during the COVID-19 pandemic and who were willing to participate in the study were included.

Exclusion criteria: Students who did not have any experience in online learning were excluded from the study.

Study Procedure

The researcher obtained permission to conduct the study. The questionnaire was prepared using Google Docs, and the participants were invited to participate online. The researcher sent invitations through social media and official letters to selected colleges. Participants were able to respond directly from their smartphones, tablets, or laptops. The present study instrument consisted of two sections. Section 1 included seven demographic characteristics: age, gender, college, academic year, previous online training, device used to attend the online program, and hours of online learning per day.

In section 2, a prevalidated Self-Efficacy Questionnaire for Online Learning (SeQoL) tool (25 items) was used to measure participants' SE in online learning with prior permission [23]. The internal consistency, measured by Cronbach's alpha, of the overall SeQoL was 0.95. The subscales ranged from 0.75 (SE to interact socially with classmates) to 0.91 (SE to complete an online course).

SE was divided into five subscales:

- **Factor 1:** SE to complete an online course- items 2, 7, 11, 12, 25, 36, 32
- **Factor 2:** SE to interact socially with classmates- items 3, 9, 31, 34
- **Factor 3:** SE to handle tools- items 15, 17, 24
- **Factor 4:** SE to interact with instructors in an online course- items 1, 4, 16, 18, 27
- **Factor 5:** SE to interact with classmates for academic purposes- items 8, 10, 29, 30, 33, 35

Participants were asked to rate their confidence from 0-10 while performing tasks in online learning. The scores were as follows: 0 for "cannot do at all," 5 for "confident to do," and 10 for "highly confident to do." The overall score ranged from 0 to 250. The maximum scores for the subscales were as follows: Factor 1 (70), Factor 2 (40), Factor 3 (30), Factor 4 (50), and Factor 5 (60). Each item was scored with a maximum score of 10. Participants were categorised as low (0-83), moderate (84-167), or high (168-250). A pilot study was conducted with 25 participants to assess the feasibility and applicability of the tool. These participants were excluded from the main study. The results of the pilot study showed a mean SE of 165 with a standard deviation of 62. Out of the 25 participants, 10 showed a low level of SE in online learning.

STATISTICAL ANALYSIS

The SPSS version 23.0 was used for data analysis. The mean and standard deviation were calculated to determine the average SE in online learning. Frequency and percentage were used to analyse the distribution of SE levels. The Chi-square test was employed to examine the association between SE and demographic variables, with a confidence level of 95%. A p-value less than 0.05 was considered statistically significant.

RESULTS

Out of the 250 students who participated in the present study, the majority were female students 184 (73.6%). Among them, 108 (43.2%) were between the ages of 20-21 years. Nearly one-third of the students 78 (31.2%) were between the ages of 22-23 years. In terms of college distribution, more than one-third of

the participants were from the applied medical sciences 90 (36%), followed by other courses 84 (33.6%), medicine (25, 10%), science 29 (11.6%), and language 22 (8.8%). The fourth-year students accounted for the largest portion, with 94 (37.6%) participants, while the third-year students accounted for more than one-fifth, with 58 (23.2%) participants. A total of 43 (17.2%) participants were in their second year. More than three-fifths of the participants had previous experience in online learning 152 (60.8%). The majority of the participants attended online lectures using a laptop 163 (65.2%), while 87 (34.8%) used a mobile phone. More than half of the students attended online lectures for 3-6 hours 141 (56.4%), while one-third attended for more than six hours 83 (33.2%), and only one-tenth attended for less than three hours 26 (10.1%) [Table/Fig-2].

Demographic variables	Participant's n (%)
Age in years	
18-19 years	32 (12.80)
20-21 years	108 (43.2)
22-23 years	78 (31.2)
23 years and above	32 (12.8)
Gender	
Male	66 (26.40)
Female	184 (73.60)
College	
Medicine	25 (10)
Applied medical science course	90 (36)
Science college	29 (11.6)
Language course	22 (8.80)
Others	84 (33.6)
Academic year	
First year	12 (4.80)
Second year	43 (17.20)
Third year	58 (23.20)
Fourth year	94 (37.60)
Fifth year	43 (17.20)
5. Previous experience of online learning	
No	98 (39.20)
Yes	152 (60.80)
6. Device used to attend the online lecture	
Mobile phone	87 (34.80)
Laptop	163 (65.20)
7. Hours you attended on average online learning/day	
<3 hours	26 (10.40)
3-6 hours	141 (56.40)
>6 hours	83 (33.20)

[Table/Fig-2]: Frequency and percentage-wise distribution of demographic data (N=250).

[Table/Fig-3] presents the mean, Standard Deviation (SD), and mean percentage of the distribution of SE in online learning among undergraduate students at the University of Tabuk. Each item in the SE scale is scored from 0-10. The mean percentage of the subsections on online SE showed minimal differences. The students showed higher SE in handling tools (mean 18.49, SD 9.76, mean percentage 61.63%) and lower SE in interacting socially with classmates (mean 22.83, SD 12.99, mean percentage 57.08%).

Area-wise Self-Efficacy (SE)	Max score	Mean	SD	Mean %
SE to complete an online course	70	42.77	21.68	61.10
SE to interact socially with classmates	40	22.83	12.99	57.08
SE to handle tools	30	18.49	9.76	61.63

SE to interact with instructors in an online course	50	29.90	15.95	59.80
SE to interact with classmates for academic purposes	60	36.86	19.18	61.43
Overall	250	150.8	77.43	60.32

[Table/Fig-3]: Mean, SD, and mean% of an area-wise distribution to assess the SE in online learning among undergraduate University of Tabuk. SD: Standard deviation

[Table/Fig-4] displays the frequency and percentages of the level of SE among the participants. Overall, nearly half of the study participants had a high level of SE (119, 47.6%). One-fourth of the students had a moderate level of SE (64, 25.6%), and one-fourth had a low level of SE (67, 26.8%). The participants had higher SE in completing an online course (125, 50%) and interacting with classmates for academic purposes (127, 50.8%). [Table/Fig-5] demonstrates that SE in online learning had a significant association with the level or year of education ($p < 0.001$), previous online education exposure ($p = 0.038$), device used to attend online lectures ($p = 0.31$), and hours of online learning ($p = 0.036$).

Level of Self-Efficacy (SE)	SE to complete an online course n (%)	SE to interact socially with classmates n (%)	SE to handle tools n (%)	SE to interact with instructors in an online course n (%)	SE to interact with classmates for academic purposes n (%)	Overall n (%)
Low	69 (27.60)	79 (31.6)	75 (30)	73 (29.2)	66 (26.4)	67 (26.8)
Moderate	56 (22.40)	72 (28.8)	53 (21.2)	59 (23.6)	57 (22.8)	64 (25.6)
High	125 (50)	99 (39.6)	122 (48.8)	118 (47.2)	127 (50.8)	119 (47.6)
Total	250 (100)	250 (100)	250 (100)	250 (100)	250 (100)	250 (100)

[Table/Fig-4]: Frequency and percentage-wise distribution to assess the level of SE.

Demographic variables	Low n (%)	Moderate n (%)	High n (%)	Chi-square test	
				χ^2 -test	p-value
Age in years					
18-19 years	11 (4.4)	6 (2.4)	15 (6)	8.768	0.187
20-21 years	29 (11.6)	36 (14.4)	43 (17.2)		
22-23 years	20 (8)	14 (5.6)	44 (17.6)		
23 years and above	7 (2.8)	8 (3.2)	17 (6.8)		
Gender					
Male	19 (7.6)	19 (7.6)	28 (11.2)	0.993	0.609
Female	48 (19.2)	45 (18)	91 (36.4)		
Academic studying currently					
Medicine	7 (2.8)	9 (3.6)	9 (3.6)	5.438	0.710
Nursing	0	0	0		
Applied medical science	20 (8)	21 (8.4)	49 (19.6)		
course	8 (3.2)	6 (2.4)	15 (6)		
Science college	7 (2.8)	7 (2.8)	8 (3.2)		
Language course	25 (10)	21 (8.4)	38 (15.2)		
Academic year					
First year	4 (1.6)	4 (1.6)	4 (1.6)	26.7178	0.000791*
Second year	21 (8.4)	14 (5.6)	8 (3.2)		
Third year	17 (6.8)	10 (4)	31 (12.4)		
Fourth year	14 (5.6)	25 (10)	55 (22)		
Fifth year	11 (4.4)	11 (4.4)	21 (8.4)		
Previous experience of online learning					
No	35 (14)	22 (8.8)	41 (16.4)	6.5292	0.038*
Yes	32 (12.8)	42 (16.8)	78 (31.2)		
Device used to attend the online lecture					
Mobile phone	32 (12.8)	18 (7.2)	37 (14.8)	6.9383	0.031*
Laptop	35 (14)	46 (18.4)	82 (32.8)		

Hours you attended on average online learning/day					
<3 Hours	12 (4.8)	4 (1.6)	10 (4)	10.412	0.036* S
3-6 hours	41 (16.4)	38 (15.2)	62 (24.8)		
>6 hours	14 (5.6)	22 (8.8)	47 (18.8)		

[Table/Fig-5]: Association between level of SE and selected demographic data.

DISCUSSION

The present study found that approximately 26.8% of participants had a low level of SE, while 25.6% had a moderate level, and 47.6% had a high level of SE. In contrast, a study from Yogyakarta reported that 40% of students had a moderate SE [22]. Conversely, another study from the University of Indonesia reported a high level of online SE among participants, which was associated with high self-regulated online learning ($p < 0.0005$) [24]. An Indian study reported a lower level (23.2%) of good online learning SE among students [25]. The level of SE differs in various studies based on the resources, technology, and background of the participants.

Aldhahi MI et al., identified a significant relationship between online satisfaction and online learning SE ($p < 0.001$) [26]. They also reported a significant correlation between online learning satisfaction and learning ($p < 0.001$), technology ($p < 0.001$), and time management ($p < 0.001$) related SE [26]. A study at Taibah University, KSA reported dissatisfaction with online learning due to the inability to fulfill the expected language of learning performance in online learning [6].

The SE refers to the capacity of an individual to accomplish specific academic functions and achieve assigned performance in learning situations. Students with high academic SE tend to be more educationally and mastery-oriented and devote more time to completing their assignments [24-26]. In the present study, the low and moderate levels of SE among participants may be attributed to the sudden shift in learning with the burden of attending online lectures for extended hours. The present study revealed that 56.4% of participants spent 3-6 hours, while 33.2% spent more than six hours attending online lectures. This sudden shift to virtual learning during the COVID-19 pandemic may not have provided reasonable opportunities for students to adapt to this teaching method. Although students are familiar with technology and gadgets in their daily lives, they may lack the specific skills required for the online learning environment [16].

The SE has a direct positive effect on student satisfaction ($\beta = 0.224$, $p < 0.01$) and academic achievement ($\beta = 0.095$, $p = 0.014 > 0.01$) according to a study from Vietnam [27]. Other studies have reported technical challenges, lack of interest, isolation, academic and communication challenges, psychological factors, low motivation, low self-confidence, fear, boredom, isolation, and limited feedback in online learning during the pandemic [6,8,9,28,29].

The present study's subscale of SE demonstrated that more participants had low SE in interacting with classmates (79, 31.6%) and handling tools (75, 30%). An Indonesian study reported low SE in technical skills, learning, staying focused in an online environment, and searching for online literature [22]. Conversely, a study from the Philippines reported higher results in SE for online technical skills (Mean=4.03) [30].

Associated factors: Three-fourths of the population in the present study were female students. Similarly, an Indonesian study also reported a higher proportion of female participants (210, 80.3%) compared to male participants (50, 19.2%) [24]. The response rates from female participants were higher than those from male participants.

A significant association was observed between SE and the level or year of study ($\chi^2 = 26.7178$, $p = 0.0007^*$). A higher SE level was noticed among students in higher education levels. Conversely,

Limiansi K and Hadi S reported higher mean SE among second-year students. In the present study, higher-level students were more mature and able to adapt to the situation faster than the lower-level learning group [22].

No significant association was found between SE and gender ($p = 0.609$), age ($p = 0.187$), and study program ($p = 0.710$). Similarly, Limiansi K and Hadi S, as well as Yan Y et al., did not identify a significant difference between male and female students in online learning, as they were in the same age group and had equal access to learning facilities [22,31].

A significant association was found between SE and previous online experience ($\chi^2 = 6.529$, $p = 0.038^*$). Students who had previous exposure and experience with online learning had higher SE in online learning. Similarly, mean SE scores were higher for individuals who perceived online teaching as effective for increasing knowledge, improving clinical skills, and developing social competencies [32]. Students with online learning experience had relatively higher SE in online learning [30,31].

A significant association was found between SE and the device used in online learning ($\chi^2 = 6.9383$, $p = 0.031^*$). Students who used a laptop for online learning had better scores in SE. Kim I et al., reported that students were distracted from their classwork every 3-4 minutes [33]. While smartphones are useful in education, they are also viewed as major distractions [34].

A significant association was found between SE and hours of online learning ($\chi^2 = 10.412$, $p = 0.036^*$). Similarly, Shen D et al., also reported that the number of online learning courses students attended had a significant effect on SE in learning [35]. Higher hours of exposure to online learning showed a higher level of SE. An Indonesian study reported that undergraduate students had less chance of utilising their online library, and it was recommended that lecturers improve the quality of online learning by providing innovative, interesting, and motivating learning materials [22].

The current study identified the level of SE among undergraduate students and provided a better understanding of the online learning experience from students' perspectives. It also identified various dimensions of SE in online learning and the association between demographic characteristics and SE levels. Overall, the SE and subsections of the SE scale showed moderate SE. One-fourth of students were observed to have low SE, while half of the students with high SE were ready for the transition from the classroom to online learning. These results are supported by previous findings [8,32]. These findings can help in the development of instructional strategies for different groups and provide adequate technical assistance to improve SE.

Limitation(s)

The present study was cross-sectional and conducted with a specific population and setting. Further research could be developed to study a larger and more diverse population from different settings.

CONCLUSION(S)

The present study found that half of the participants had moderate to low SE in online learning, while the other half had high SE. Overall, the mean scores on SE indicated a moderate level. This could be attributed to the learners' first-time involvement in online education. Academicians should continue dedicating some hours to online learning in their courses even after the pandemic. This will help strengthen the online learning system and better prepare for any such situations in the future.

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