

Self-efficacy and Online Learning Readiness of Undergraduate Dental Students in Pakistan During COVID-19 Pandemic

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ABSTRACT

Objective: To investigate the correlation between general self-efficacy and online learning readiness among Pakistani undergraduate dental students.

Study Design: Cross-sectional study.

Place and Duration of the Study: Riphah International University, Islamabad, between September 2020 and March 2021.

Methodology: Using cluster sampling, three dental colleges of Islamabad and Rawalpindi were selected. Electronic questionnaires were sent to 750 students. The questionnaire was comprised of two instruments, General Self-Efficacy Scale (GSES), and Online Learning Readiness Scale (OLRS). GSES had 10-items with response measurement on four-point Likert scale, while the OLRs had 18 items in five different domains measured by five-point Likert scale. Data were analysed using SPSS-23. Correlation between dependent variables was calculated using linear regression analysis.

Results: The response rate was 59.3% with a predominant response from female students (82.2%) compared with male students (17.8%). The majority of responses were recorded from third year students (27.9%). The year four students' scores for GSE, computer and internet self-efficacy, and self-directed learning differed significantly from other students. The overall mean GSE score was 29.37 ± 4.57 . Regression indicated a low degree of correlation between GSE and the five domains of OLRs with r^2 values ranging from 0.12 to 0.32.

Conclusion: A weak to moderate correlation was found between self-efficacy and the five dimensions of online learning readiness among Pakistani undergraduate dental students as depicted by the r-values.

Key Words: Cross-sectional studies, Dental education, Dental students, Dentistry, Efficacy, Online learning, Questionnaire.

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INTRODUCTION

Teachers and learners in educational institutions are critically affected by the unprecedented shifts in educational trends because of the COVID-19 outbreak.¹ To avoid social contact many prestigious institutes worldwide have shifted their focus from face-to-face teaching to online platforms.² Higher Education Commission (HEC) Pakistan encouraged the universities in March 2020 to start online teaching due to the closure of all academic institutions as per Government's directives.

All universities including healthcare education universities adopted online teaching and learning during strict lockdowns and a blended approach involving both online and on-campus sessions during lockouts.³

As undergraduate dental healthcare education has a significant skill component, the online delivery of dental education deprives the students of hands-on experience in the pre-clinical labs and clinical departments.⁴ Moreover, the students' inability to attend problem-based learning (PBL) sessions, face-to-face interactive lectures, and form study groups deprives them of a social interaction opportunity which generates a lot of stress and anxiety. Although dental teachers and students have adapted to the changing trends, it has been observed that many dental students are not able to achieve the desired outcomes and are found grappling with online learning schemes.^{4,6} This observation is concerning and it requires the teachers and educators to improve online student engagement by helping students cope with the changing demands. It has been established that self-efficacious people are better at adapting and

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coping with change.^{7,8} Perceived self-efficacy is described as an individual's judgment or belief regarding their capability to carry out a behaviour.⁹ It is an optimistic self-belief of someone to deal with a range of difficult demands and pressures in life. Learning during the COVID-19 pandemic is an emotionally and psychologically challenging phase for students. This study aimed to explore the correlation between general self-efficacy and the readiness to gain benefit from online learning in undergraduate dental students from the first year to the final year.

METHODOLOGY

Approval was obtained from the Ethical Committee at the Faculty of Dentistry, Riphah International University. A cross-sectional online survey of dental students in Islamabad and Rawalpindi was conducted from September 2020 to March 2021. Cluster sampling was used to identify three dental colleges of Islamabad and Rawalpindi. Using population sampling the questionnaire was created on Google Forms and sent to all dental students at these dental colleges through emails and WhatsApp groups. Informed consent was also attached at the start of the questionnaire. Qualtrics sample size calculator was utilised for sample size calculation.¹⁰ The total students population of the three dental colleges was 750. The confidence level and margin of error were set at 99% and 4%, respectively. The acceptable response rate for the survey was calculated as 58.13% (436 responses).

All 750 students in years 1 to 4 at these three dental colleges were sent an electronic survey via Google Forms from October 2020 to January 2021. During this period, students either were taught through an online-only medium during lockdowns or via a blended approach with alternate on-campus days during lockdowns. All dental students studying at the undergraduate level in the three dental colleges were included in this study to avoid participant selection bias. Each potential participant was requested to comprehend the study's purpose and provide informed consent before filling in the questionnaire. The identity of the respondents remained confidential. No patients were involved in this study.

Demographic characteristics, such as age, gender, and year of study were included. Two open-ended questions were included to ask (i) How many times a week do you attend online classes? and (ii) How many hours a day do you spend on online learning? The two instruments utilised were General Self-Efficacy Scale (GSES) and Online Learning Readiness Scale (OLRS).^{11,12}

The GSES is a measure of the perceived self-efficacy of the person on coping, adapting, and focusing mechanisms during routine and stressful life events. Bandura *et al.* has described Self-efficacy as an individual's belief in his or her ability to organise and implement action to produce the desired achievements and results.¹³ The validity and reliability of GSES have been established in twenty-five countries worldwide, with reported Cronbach's alpha values ranging between 0.76 to 0.90.

GSES is a self-reported 10-items questionnaire with a four-point Likert scale. The sum of all items evaluated constitutes the total score which ranges between 10 and 40, where higher total score means better self efficacy. According to a study, perceived self efficacy measured from the short form of the scale is highly consistent ($r=0.87$) with the results obtained from the original long form of this scale.⁹

The OLRS, is a validated questionnaire with composite reliability ranging from 0.73 to 0.88, created by Hung *et al.* in 2010¹⁰ and used in settings worldwide. This consisted of five domains with total of 18 items as follow: (1) Computer/internet self-efficacy (Three-items); (2) Self-directed learning (Five-items); (3) Learner control (Three-items); (4) Motivation for learning (Four-items), and (5) online communication self-efficacy (Three-items). The OLRS was used in this study with permission from the principal author.

Google Form database spreadsheet was used for data entry. The SPSS version 24 was used for statistical analysis. In order to compare the mean differences in the domain scores between the students of different years, one-way ANOVA was applied. Post-hoc Tukey analysis was done to compare the inter-group mean differences. The relationship of General self-efficacy scores with the scores of the five dimensions was modelled using linear regression analysis. Pearson's correlation coefficients were calculated to assess the strength of the relationship between the total GSE score and each of the five dimension scores. Results are shown as Odds Ratio with 95% Confidence Interval, and p-value set at <0.05 .

RESULTS

A total of 445 students responded out of 750, with a response rate of 59.3%. There were 312 (70.1%) students from Islamic International Dental College, 67 (15.1%) from Foundation University College of Dentistry and 66 (14.8%) from Islamabad Medical and Dental College. A female predominance was noted in our sample with 366 (82.2%) female students and 79 (17.8%) male students. Third-year students represented the highest proportion ($n = 124$, 27.9%), followed by final year ($n = 117$, 26.3%), second year ($n = 109$, 24.5%), and first year dental students ($n = 95$, 21.3%). The mean age of the participants was 21.25 ± 1.64 years.

Only one student did not attend online classes. Most of the students attended online classes five times a week ($n = 244$, 54.8%). Students spent a mean 14.64 ± 26.06 hours every week during the COVID-19 period for online learning.

The overall mean GSE score was 29.37 ± 4.57 . The mean values for self-efficacy and the scores for the five dimensions of online overall readiness are shown in Table I. There is a statistically significant difference in the scores of 4th year as compared to other years in domains of GSE total scores, Computer and internet self-efficacy and self-directed learning. The mean difference between 4th year and other years is negative and the said values are significantly reflected in Table II.

Table I: Scores for GSE (general self-efficacy) and five dimensions of online overall readiness.

Overall GSE	Computer / Internet Self-efficacy	Self-Directed Learning	Learner Control	Motivation for Learning	Online Communication Self-efficacy
29.37 ± 4.57	11.35 ± 2.22	18.08 ± 3.02	9.37 ± 1.90	15.66 ± 2.29	10.26 ± 2.23

Table II: Multiple comparisons between different years of study.

Dependent Variable	(I) Year	(J) Year	Mean Difference (I-J)	p-value*
GSE Total	4 th year	1 st year	-1.98	<0.001
		2 nd year	-1.75	<0.001
		3 rd year	-1.75	<0.001
Computer/Internet Self-efficacy	4 th year	1 st year	-0.79	<0.001
		2 nd year	-0.83	<0.001
		3 rd year	-0.33	>0.001
Self-directed Learning	4 th year	1 st year	-1.16	<0.001
		2 nd year	-1.35	<0.001
		3 rd year	-1.37	<0.001

*One Way ANOVA and Post-hoc Tukey Analysis.

Table III: Linear regression and correlational analysis to assess the relationship between general self-efficacy scores and the five dimensions of online overall readiness.

	R-square	B	p-value	Correlational coefficient (p-value)
Computer/internet self-efficacy	0.32	0.087	<0.001	0.179 (<0.001)
Self-directed learning	0.122	0.232	<0.001	0.350 (<0.001)
Learner control	0.351	0.146	<0.001	0.351 (<0.001)
Motivation for learning	0.251	0.663	<0.001	0.349 (<0.001)
Online communication self-efficacy	0.118	0.168	<0.001	0.343 (<0.001)

Linear regression modelling was done to assess the nature of the relationship of General self-efficacy scores with the scores of five dimensions of online overall readiness, as illustrated in Table III. Pearson's correlation coefficient values for the correlation between the total GSE score and each of the five dimension scores have been shown in Table III. All of the correlational coefficient (r) values were statistically significant. While the r-value for computer/internet self-efficacy was weak (0.179), the values for the other four dimension scores were moderate.

DISCUSSION

The COVID-19 pandemic has transformed today's world in terms of shifting physical presence to virtual presence, instead of people going towards the resources, the resources are channelised towards people. Consequently, the dependence on online learning platforms has increased forcing educational institutes worldwide to adapt to this transformation. But this shift to online virtual learning has an impact on students, faculty, and institutes.¹⁴ HEC Pakistan provided an online teaching preparedness agenda encompassing six points. Readiness of the university, course, faculty, library, technology and students, all had to be appropriately managed to ensure effective delivery of online sessions.¹⁵ This study intended to evaluate self-efficacy and online learning readiness in undergraduate dental students and correlate the self-efficacy levels to different domains of online learning readiness.

A female predominance over males was observed with a maximum response rate from third and final-year dental students. This demographic distribution is in line with that reported by Sarwar *et al.* where females constituted 72.6% of the study population with a maximum response rate from second and final year dental students.¹⁶ Similarly, Chung *et al.* reported 80.2% female predominance with maximum response rate from second-year dental students.¹⁷ In contrast, Engine and Ansar *et al.* in their studies on online teaching readiness reported a slight male predominance as compared to females.^{18,19}

The overall general self-efficacy score for this study population was high. The mean scores of online readiness were also high for this study cohort with values ranging between 18.02±3.02 to 9.37±1.90 for all five dimensions. The values fell between moderate to strong agreement on the scale mostly. Chung *et al.* reported OLSR mean scores between 3.49 to 4.23 which falls between slight disagreement to moderate agreement category.¹⁷ This study reported the mean values of each question of the domain and then reported mean of domain based on the mean results for the included questions. However, the results are of the collective domain. Results reported by Chung *et al.* closely correlate with the present study findings if interpretation criteria are standardised. Chung *et al.* also reported the highest level of readiness in computer and internet self-efficacy domain followed by self-directed learning and motivation for learning and the lowest for online communication self-efficacy and

learner control.¹⁷ This study reported the highest readiness for self-directed learning followed by motivation for learning and internet self-efficacy followed by online communication self-efficacy and the lowest for learner control. Similar findings have been reported by Hung *et al.*, Salaberry and McVay in their studies showing high online communication self-efficacy.²⁰⁻²² Engine has reported the highest mean scores for online communication self-efficacy and self-directed learning while the lowest for learner control.¹⁹ The results of 1st year, 2nd year, and 3rd years were all positively related and comparable with a statistically significant value. The mean difference of scores of 4th year in domains of GSE, computer/internet self-efficacy and self-directed learning are negative as compared to other years. All of these group mean differences are statistically significant except the means of 4th year vs. 3rd year in the domain of computer/internet self-efficacy. The negative difference reflects a reversal in directionality of the effect. At the given confidence interval and p-value of <0.05, the scores of other years are better as compared to scores of 4th year. This may be attributed to a number of reasons like exposure and use of internet, exposure to adult learning sessions, motivation etc., but this needs to be elaborated more through qualitative research to ascertain the reasons for this statistically significant result. So, the findings of this study cohort resemble international and national studies in terms of higher values for online readiness. However, the domain-specific scores are comparable yet different based on contextual variances in gender, population sample size, and year of study.

Linear regression analysis was performed to correlate overall GSE scores and domains of OLRs. The B-value for all five domains of OLRs are positive indicating its positive correlation with self-efficacy. This shows that an increase in self-efficacy affects online readiness positively. The p-value for all the domains was less than 0.01 which indicated that this correlation is statistically significant. However, the unadjusted r^2 values range between 0.118 to 0.35 which are less than 0.7 and hence indicate a poor model fit. Gordon and Gabriel reported a statistically significant relationship between self-efficacy scores and online learning readiness in their study on first- and second-year students of the university with males respondents scoring higher for e learning readiness.²³ Nyagorme reported that degree of involvement in e-learning *i.e.*, online learning readiness is correlated to self-efficacy.²⁴ Similar results have been reported by Ayub *et al.* stating that e-learning self-efficacy is a positive predictor for readiness to do online courses.²⁵ So, although being a poor fit model statistically, the results of this study agree with the international and national studies. Thus making it a considerable evidence to be used for future studies.

CONCLUSION

High scores for both self-efficacy and online learning readiness were seen in a female predominant sample of undergraduate students. A statistically significant variation in GSE

total scores, computer and internet self-efficacy, and self-directed learning scores between 4th year students and those of other years were observed. Self-efficacy and online learning readiness were found to have a weak to moderate correlation as depicted by the r-values.

ETHICAL APPROVAL:

The ethical committee at the Faculty of Dentistry, Riphah International University, Islamabad, Pakistan has approved the research proposal before the initiation of the research work.

COMPETING INTEREST:

The authors declared no competing interest.

AUTHORS' CONTRIBUTION:

MM, MS: Study design, data collection and analysis, data interpretation, and write up.

MHBS: Data entry, interpretation analysis and review. Collected data and contributed to manuscript writing. AA, UAB: Study design and critical review/ revision of the draft.

MQJ: Data interpretation, drafting/revision of work and final review of the manuscript.

All the authors have read and approved the final version of the manuscript and will be accountable for all aspects of the work.

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