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Adaption of distance learning to continue the academic year amid COVID-19 lockdown

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ABSTRACT

This work investigates the use of distance learning in saving students’ academic year amid COVID-19 lockdown. It assesses the adoption of distance learning using various online application tools that have gained widespread attention during the coronavirus infectious disease 2019 (COVID-19) pandemic. Distance learning thrives as a legitimate alternative to classroom instructions, as major cities around the globe are locked down amid the COVID-19 pandemic. To save the academic year, educational institutions have reacted to the situation impulsively and adopted distance learning platforms using online resources. This study surveyed random undergraduate students to identify the impact of trust in formal and informal information sources, awareness and the readiness to adopt distance learning. In this study, we have hypothesized that adopting distance learning is an outcome of situational awareness and readiness, which is achieved by the trust in the information sources related to distance learning. The findings indicate that trust in information sources such as institute and media information or interpersonal communication related to distance learning programs is correlated with awareness (β = 0.423, t = 12.296, p = 0.000) and contribute to readiness (β = 0.593, t = 28.762, p = 0.001). The structural model path coefficient indicates that readiness strongly influences the adoption of distance learning (β = 0.660, t = 12.798, p = 0.000) amid the COVID-19 pandemic. Our proposed model recorded a predictive relevance (Q2) of 0.377 for awareness, 0.559 for readiness, and 0.309 for the adoption of distance learning, which explains how well the model and its parameter estimates reconstruct the values. This study concludes with implications for further research in this area.

1. Introduction

Distance learning has revolutionized education; the terminology describes many types of teaching situations (Jowsey, 2020; Qazi, 2021). The use of distance learning dates back to the use of correspondence based studies in Europe (Valentine, 2002; Diacopoulos and Crompton, 2020). However, the emergence of the internet and online learning applications such as Zoom, Microsoft teams, Google classroom, and others has revolutionized distance learning protocols in online teaching using the internet. The global COVID-19 pandemic has led to a shutdown of cities worldwide. Closure of educational institutes was the first step to restrict mass gatherings and enforce social distancing practices...
In unprecedented times such as the one created by the COVID-19 pandemic, students are vulnerable to suffering in academics, socializing, and career lapses. However, the adoption of distance learning technologies to continue the academic calendar emerged as the best make-shift solution amid the COVID-19 pandemic (Wildier-Smith and Freedman, 2020; Bank, 2020; Pearson, 2020). The education sector reacts to an impulsive shift to distance learning using online resources (Siddiqui, 2020; Learning, C.W.o., Keeping the doors of learning open COVID-19., 2020; Toh and Kirschner, 2020). Since the beginning of the COVID-19 pandemic, the world has seen a sudden surge in online management software, helping educators manage and deliver lectures (Siddiqui, 2020; Learning, C.W.o., Keeping the doors of learning open COVID-19., 2020; Toh and Kirschner, 2020).

In unprecedented times such as the one created by the COVID-19 pandemic, students are vulnerable to suffering in academics, socializing, and career lapses. However, the adoption of distance learning technologies to continue the academic calendar emerged as the best make-shift solution amid the COVID-19 pandemic (Wildier-Smith and Freedman, 2020; Bank, 2020; Pearson, 2020). The education sector reacts to an impulsive shift to distance learning using online resources (Siddiqui, 2020; Learning, C.W.o., Keeping the doors of learning open COVID-19., 2020; Toh and Kirschner, 2020). Since the beginning of the COVID-19 pandemic, the world has seen a sudden surge in online management software, helping educators manage and deliver lectures (Siddiqui, 2020; Learning, C.W.o., Keeping the doors of learning open COVID-19., 2020; Toh and Kirschner, 2020).

According to the Endsley model, this theory (SAT) is widely used by researchers to increase awareness of managing healthcare emergencies (Stubbings et al., 2012; Cooper, 2010; Qazi, 2020; Mittelmeier, 2019). It is further integrated with technology readiness (TR) and adopting the e-service system (Huff and Gosha, 2018; Acheampong, 2017). It was reported that information influences one’s situational awareness. We report a theoretical model that incorporates awareness (perceived understanding), readiness (experience, access, familiarity) and adoption of distance learning (Fig. 1). However, no detailed study using a combination of these variables for online learning amid COVID-19 has been conducted to date. Therefore, we developed the study underlying theoretical and logical support for their potential importance in the context of COVID-19.

We tested this model against data collected in the peak phase of the COVID-19 pandemic to examine how the trust in risk prevention information in academic scenarios is associated with distance learning adoption. In this research, we have investigated and analyzed the adoption of distance learning among college students during the COVID-19 pandemic for several salient purposes. The first is to evaluate college students’ trust in information sources related to distance learning during the COVID-19 pandemic and provide a theoretical basis to adopt interferences with college students and deliver a basis for the declaration of national policies.

3. Method

3.1. Study design

The survey questionnaire was developed for response estimation on a 5-point Likert scales ranging from 1 for strongly disagree to 5 for strongly agree. Respondents were asked to rate the perceived level of effectiveness of 17 items on distance learning practices amid COVID-19. Furthermore, the development of study items is based on research on trust in information related to distance learning amid COVID-19, situational awareness and readiness that advises learners to develop individual beliefs that influence acceptance of behaviour related to the specific situation underlying the existing literature (Iqbal and Ahmed Bhatti, 2015; Qazi, 2020; xxxx; Liao, 2010; Grandison and Sloman, 2000; Chapnick, 2000; Antonietti et al., 2008; Alaeddin and Altonjny, 2018; Ngai et al., 2007; Mohammadi, 2015).

The final section of the survey included open-ended responses. Respondents were asked to express their opinions on distance learning to continue education when being put into self-isolation or mandatory quarantine (at home). The questionnaire was distributed among various provinces in Pakistan and reviewed by three PhD students and two virologists for constructing items and contextual relevance. An online link was then generated to collect responses.

3.2. Data collection

The population was randomly sampled from college students to record their opinions that are important to find the facts on a certain situation (Qazi, 2014; Qazi, 2017; Qazi, 2021). A structured questionnaire was exploited to record the responses during the COVID-19 lockdown. A total of 220 responses were recorded anonymously, from which a total of 150 valid responses amounted to a 68.2% response rate for the open
4.1. Measurement model

Composite reliability, along with average variance. Loading was estimated using PLS Smart Version 3, which tests causal models using philosophical and influential constructs (Baron and Kenny, 1986; Temme et al., 2006; Davenport and Prusak, 1998; Davis et al., 1989). It is a 2-step analysis comprising measurement and structural model assessments. Furthermore, to determine students’ sentiment amid COVID-19 with the use of textual analysis, sentiment analysis was performed on the 150 open-ended question responses. The manual card sorting approach was used to classify the sentiments into positive, negative, and neutral classes (Hudson, 2005; Qazi, 2017; Qazi, 2014). Charts and word clouds were then used to visualize the classification and denote the opinion occurrences’ frequency.

3.3. Data analysis

The measurement model was conducted to determine the validity and reliability of the constructs. This approach is appropriate to test the hypotheses by conducting path analyses. The study’s suggested model was tested using PLS-Graph. The initial screening of data and factor analysis were carried out using SPSS. The Partial Least Squares (PLS) technique was employed to test the suggested model presented in Fig. 1. PLS is a well-established technique with path analytics modelling using latent variables (Baron and Kenny, 1986). It is used for assessing the theories at their stages for testing the causal models and supporting the assessment through both reflective and formative constructs (Qazi, 2020).

3.4. Ethical consideration

All participants were informed about the study’s purpose before getting involved in the study, and we have received voluntarily informed consent from all the participants.

4. Results

The study model was analyzed using a PLS-Graph. The initial screening of data and factor analysis were carried out using SPSS. The Partial Least Squares (PLS) technique was employed to test the suggested model presented in Fig. 1. PLS is a well-established technique with path analytics modelling using latent variables (Baron and Kenny, 1986). It is used for assessing the theories at their stages for testing the causal models and supporting the assessment through both reflective and formative constructs (Qazi, 2020).

4.1. Measurement model

Construct validity, which is determined using both discriminants, and convergent validity, show that the constructs are well related. Three tests were used to show convergent validity. These were an item and composite reliability, along with average variance. Loading was estimated at or above 0.5. This indicates that the suitable reliability of an item explains 50% of the constructs. Results show that all reported items have loadings ≥0.5.

The reliability test results show robust internal consistency reliability, as indicated by composite reliability. The outcome ranges between 0.873 and 1.000, which exceeds the threshold of 0.70 (Nunnally, 1994). The outcome shows that CR’s value has satisfactory loadings for internal consistency reliability (Table 1). Cronbach’s alpha provides composite reliability; values > 0.6 demonstrate adequacy. This study’s composite reliabilities lie around > 0.8 and Cronbach’s alpha > 0.7 (Table 1). Finally, the average variance extracted (AVE) is > 0.50, which justifies the item validity (Fornell and Larcker, 1981). It is thus concluded that the constructs have satisfactory convergent validity.

The discriminant validity outcome is reported based on Fornell and Larcker’s recommendation (Fornell and Larcker, 1981). Table 2 presents the results of testing our measure discriminant validity using the HTMT ratio. Specifically, an HTMT value of 0.85 is considered as a strict threshold to ensure discriminant validity. It is fair to conclude that the model has achieved internal consistency, convergent and discriminant validity, and, consequently, the structural model’s determination.

4.2. Structural model

The bootstrapping and percentile bootstrap confidence interval of 95% was used to assess a reliable path coefficient. Table 3 presents the structural model path coefficients. As shown from the table, all the path coefficients are highly significant and therefore accepted as supporting the predefined hypothesis. Specifically, the path coefficients between trust in formal & informal information > Awareness (β = 0.423, t = 12.296, p = 0.000) were highly significant, hence, accepted.

Similarly, the path coefficients leading to readiness, namely; Awareness > Readiness (β = 0.593, t = 28.762, p = 0.001), were highly significant and thus accepted. Finally, the path coefficient between the Readiness and ADL (β = 0.660, t = 12.798, p = 0.000) was highly significant, hence, accepted.

Predictive relevance (Q²) was evaluated using the Stone-Geisser test. It is defined as the “degree of well-observed values that are reconstructed using the model and parameter estimates” (Urbach and Ahlemann, 2010). Q² is recognized through blindfolding; its value > 0 signifies predictive relevance. In this study, predictive relevance values were 0.377 for awareness, 0.559 for readiness, and 0.309 for internal consistency reliability (Table 1). Cronbach’s alpha provides composite reliability; values > 0.6 demonstrate adequacy. This study’s composite reliabilities lie around > 0.8 and Cronbach’s alpha > 0.7 (Table 1). Finally, the average variance extracted (AVE) is > 0.50, which justifies the item validity (Fornell and Larcker, 1981). It is thus concluded that the constructs have satisfactory convergent validity.

The discriminant validity outcome is reported based on Fornell and Larcker’s recommendation (Fornell and Larcker, 1981) Table 2. AVE’s square roots are shown as matrix diagonals; these are all higher than off-diagonal elements, thus supporting our scales’ discriminant validity.

The heterotrait-monotrait (HTMT) ratio of correlation was introduced as a novel method of validating discriminant validity (Henseler et al., 2015). Table 2 presents the results of testing our measure scales’ discriminant validity using the HTMT ratio. Specifically, an HTMT value of 0.85 is considered as a strict threshold to ensure discriminant validity. It is fair to conclude that the model has achieved internal consistency, convergent and discriminant validity, and, consequently, the structural model’s determination.

### Table 1

| Constructs                          | Cronbach’s Alpha | CR  | AVE  |
|------------------------------------|------------------|-----|------|
| Trust in formal & informal information | 0.803            | 0.884 | 0.766 |
| Awareness                          | 0.910            | 0.873 | 0.754 |
| Readiness                          | 0.871            | 0.940 | 0.743 |
| ADL                                | 0.877            | 0.916 | 0.732 |

Fig. 1. Proposed distance learning adoption model.
distance learning adoption.

4.3. Sentiment analysis

Outcomes of sentiment analysis revealed that over 70% of responses relate positively to using smart technology to adopt distance learning amid COVID-19. Most respondents expressed positive emotions and mentioned that using smart technology applications has emerged as a guiding light amid COVID-19 lockdown. However, a few of the respondents showed neutral responses using smart technology. Some of the responses were classified as negative, as the respondents complained of poor internet connectivity, accessibility, and smart technology availability. Figs. 2 and 3 depict the graphical representation of manually classified sentiments and most frequently received sentiments.

5. Discussion

This study aimed to test a hypothesized model of associations between trust in information sources, situational awareness, and readiness to adopt distance learning as a health-protective behaviour amid the COVID-19 pandemic. The model suggested trust in sources of information increased the adoption of distance learning practices. This study’s findings are consistent with previous reports that have suggested that adoption of a particular behaviour is linked to situational awareness (Liao, 2010; Rubin et al., 2010) and readiness for adopting a change (Gilbert, 2020) during a public health emergency.

Outcomes revealed that trust in information sources related to distance learning is associated with awareness (perceived understanding) that enabled readiness (experience, access, and familiarity) to influence the use of distance learning amid COVID-19. Trust is a combination of different attributes such as reliability, dependability, honesty, truthfulness, security, competence, etc. However, most importantly, trust is typically specified as the relationship between the trustor (i.e., the person who trusts) and the trustee (i.e., the person who is trusted) (Grandison and Sloman, 2000). This is evident from our study’s findings; the trustworthiness between information sources and students using the online learning system influences decisions to use it (Calman, 2002; Sousa et al., 2004; Wang, 2014), which seems to be associated with situational awareness involving perceived understanding and readiness to the use of distance learning.

The perceived understanding of the health threat, e.g. COVID-19, contributes to awareness, leading to readiness action, conceivable and theoretically consistent (Qazi, 2020; Slaughter, 2005). The students need to have the adequate technological computer knowledge to avoid the frustrations experienced when accessing online learning technologies (Coopasami and Knight, 2017). Therefore, we have assessed students’ readiness to use distance learning in terms of familiarity, access, and experience. We found that access, experience, and familiarity of technology resources for learning contribute to readiness for use, and the results are theoretically consistent (Rahimi and Katal, 2012). Similarly, we found that readiness leads to the use of distance learning.

Distance learning plays an important role in avoiding face-to-face contact that is encouraged to avoid any further spread of COVID-19 (McCloskey, 2020). It signifies the positive influence of technology on learning outcomes (Reynolds et al., 2003). Overall, trust in information regarding distance learning sources is important for learning.
During pandemics, trust leads to situational awareness, which leads to readiness, impacting the adoption of distance learning practices. Hence, the adoption of technology practices allows for a more flexible and convenient learning process (Denan, 2020) and maintains social distancing amid COVID-19.

The sentiment analysis outcome was mostly positive in adopting smart technology amid the COVID-19 pandemic for distance learning purposes. People feel that distance learning using online tools has helped them avoid at least one aspect contributing to fear and anxiety and saved an academic year using smart technology. The adoption of distance learning has emerged as a support for teachers and students alike. The findings are consistent with previous works (Toh and Kirschner, 2020; Gijselaers, 2016). The majority of the respondents think positively of the adoption of distance learning, but some complained about connectivity issues in using online apps. The COVID-19 pandemic has highlighted the educational and internet divide like never before (xxx). Finally, the study suggests that since reduced social mixing is demanded to control the spread of the COVID-19 pandemic, then the adoption of distance learning can play a vital role in making a good balance amid COVID-19. There is also a need to make the public aware and ready to adopt distance learning successfully.

6. Conclusion

The only option available to the authorities is the closure of educational institutes during the pandemic. The adoption of distance learning allows us to maintain social distancing and stay protected while simultaneously learning amid COVID-19. However, to the best of our knowledge, no study has been conducted to evaluate the hypothesis that students’ adoption of distance learning is an outcome of situational awareness and readiness achieved by the trust in information sources related to distance learning. Therefore, tested the hypothesis, and the results reveal that trust in information sources is positively associated with awareness. The outcome of this survey also suggests that awareness is a contributing factor to readiness. The structural model path coefficient has indicated that readiness has a strong influence on adopting distance learning amid the COVID-19 pandemic. This study offers several implications for practitioners and policymakers and future work for researchers in this area. Given the importance of students’ awareness and readiness during health emergencies, we predict our findings will be valuable to others who engage in this field’s theory and practice. The study concludes that students and instructors should pay more attention to developing trust in information sources, situational awareness, and readiness to adopt distance learning amid pandemic when social distancing is imposed for future success.

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