COVID-19 PANDEMIC AND THE DIGITAL REVOLUTION IN ACADEMIA AND HIGHER EDUCATION: AN EMPIRICAL STUDY

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ABSTRACT

While learning online during the pandemic, students faced so many problems, difficulties, and challenges with respect to stress, worry, and anxiety, technology adaptability, course content delivery, and the digital transformation from a physical classroom to an online mode amidst the pandemic. This research aims to explore challenges faced by students using a student online survey, and data was analyzed using SPSS for students' online learning experiences amidst the pandemic, which was handled adequately. The extraction of common factor variances from measure sets for prominent factors to measure the transformational shift from offline to online digital learning was done using exploratory factor analysis. Sampling adequacy measurement test for KMO A correlation matrix that indicates whether the variables are unrelated in Bartlett's sphericity test, in which the level of significance gives the test result, showed in the present study that significant relationships exist among variables and there is high correlation. Principle Component Analysis (PCA) with Varimax Rotation used for challenges showed inter-correlation and a significant relationship between the challenges students faced in digital mode with a significant P value at the 5% level of significance. Regression analysis of the H0 variable's relationship with one or more variables revealed a significant constant value for psychological, technological, and personal opinion as three representative factors found to be significant, indicating that the H0 is rejected.

KEYWORDS	Challenges, Education, Learning Online, Pandemic, Tools

INTRODUCTION

As stated by Sáiz-Manzanares et al (2019) and Leszczyński et al (2018) digital transformation in higher education is not new, and as a relevant subject, education stakeholders must be concerned about and train professionals to tackle obstacles. This transition aids in the adjustment to new technology (Abad-Segura et al., 2020) and Covid-19 modifications. The sum of all digital procedures required to achieve a transformation that enables educational institutions to use digital technology in an optimal and beneficial manner is referred to as "digital transformation." It is a process that necessitates strategic planning, building trust, merging ideas, and strengthening the parties involved, as well as collaboration and knowledge separation inside the business (Cameron & Green, 2019). According to Hitz & Turnoff (2005), digital transformation has shifted physical teaching to online hybrid learning, and digital technology has labeled this process of replacement as disruptive. The COVID-19 pandemic triggered the digital transformation, resulting in several pieces of legislation being quietly introduced within a few days (Strielkowski, 2020), giving the online learning brand a messiah status from a disruptive process. Bozkurt & Sharma (2020) say that online education comprises online teaching and learning.

Careful preparation for design and instruction, as well as the use of a well-organized model at the design and instruction level, is a must for online learning to be effective, and instead of online education, emergency remote teaching was used (Vlachopoulos, 2011; Bozkurt & Sharma, 2020). Many people in society and the educational community have expressed concerns regarding the quality of online learning. In the context of satisfaction, a student's perception of their experience acts as a substitute for learning engagement (Swan, 2002; Arbaugh, 2001; Richardson, 2001). Most students see information as a commodity that can be freely traded within the learning community and is critical to academic outcomes. Modern technologies are responsible for traditional classroom boundary resolution. Norberg (Dziuban & Moskal, 2011) developed a time-based blended learning model that altered the role of the instructor, whereas Liu & Hwang (2010) focused on student preferences in the learning environment. As indicated by the students, they live in a highly engaged world and have similar expectations of their lectures. Students evaluate online learning on the importance of teacher presence, and (Kuo et al., 2013) state that both face-to-face and online learning play an important role. While learning online, Francisco et al (2012) found that demographics and culture had an impact on interaction strategy design.

The COVID-19 pandemic caused logistical challenges in the instructors' and learners' attitudes, as noted by Kara & DeShields (2004) and research identifying the factors influencing the students' satisfaction was needed. According to (Appleton-Knapp & Krentler, 2006), evaluating students' needs and expectations would improve their satisfaction. Smart and Cappel (2006) indicated that variable identification affected students' satisfaction with online learning. Kopp et al., (2019) while evaluating the assumption of digital transformation, identified obstacles related to changes, pace, technology competency, and finance. The educational use of technological tools and devices on the internet is called "online learning," as stated by Neans et al., (2009) and the increasing innovation in technology access to the internet has motivated "learning online," as added by (Tang & Byrne, 2007). It is debatable whether online learning can replace face-to-face instruction (Aminger et al., 2021). Many critical challenges affecting online learning stemmed from the instructor's evaluation of students' academic integrity (Algahtani et al., 2020). Cyber bullying or stalking (Bond et al., 2018) no internet access, low quality instructional Delivery Stein (2020), professional training in technology access,

(Sandkuhl & Lehmann, 2017) in accessible tools and technology issues challenges related to customizing lectures and online assessment tools. Cochrant (2016) found that online instruction skills are the foundation of online environment interaction, as added by Sáiz-Manzanares et al (2019). that many learners prefer custom or personalized video lectures that help them learn. COVID-19 had a negative impact on students' learning activities. Carnaghan & Webb (2007) investigate the impact of students' COVID-19 performance on their learning achievement and learning approach. Arbaugh (2007) included factoring methods and retrieved primary constructs exhibiting excellent reliability. Stewart Hong (2004) used the principal component analysis, and the dimension of complexity was found to define student satisfaction in online learning. Elements related to online evaluation like active interaction, task time, and the cooperation of students were found by Akdemir & Koszalka (2008) who, by using exploratory and confirmatory factor methods, validated their previous findings. Classification and repression trees were used by (Dziuban & Moskal, 2011), like facilitation, information and concept communication, and student concern and respect. Guttman (1954) investigated student perceptions of online learning using image analysis, where one general component was constant across all modalities. Dziuban et al (2013) investigated challenges linked to campus resources for learners' support and identified different designs, instructions, and delivery methods to encourage students' learning desires. In Armstrong's (2011) research on online learning, students preserved the positive attributes of technology. Students were more comfortable when learning was done face-to-face (Zhang Peris, 2004). Factors contributing to online student satisfaction include clear and relevant assignment and communication, campus-based resource access, technical support availability, and course equipment and technology orientation. In an online setting, student and faculty support, as well as an appreciation for preparation, are required. Factors related to perceived assessment fairness and personal cognitions' impact were reported by Branch & Dousay (2015). Muhammad et al (2020) provided learners with computer anxiety, ease of use, course quality, and e-learning assessment diversity.

While learning online during the pandemic, students faced so many problems, difficulties, and challenges with respect to stress, worry, and anxiety, technology adaptability, course content delivery, and the digital transformation from online mode to face-to-face classroom learning. The purpose of this research is to discover the problems, difficulties, and challenges that students encountered while learning online.

Respondents in the study are limited to only Goa residents who participated in this study. It is not fully representative of the general population throughout India.

RESEARCH METHOD

The sample frame will be limited to Goan students in the age categories of 13–15 (28%), 16–18 (27%), 19–21 (27%), and 22 and above (18%). 8th–10th grade STD (29%), XII (27%), UG (27%), and PG (18%) were the classes I took. The sample size includes a total of 300 usable responses from students of different age categories and levels of education. The research design used is a descriptive research design. The selection of respondents will be done by purposive sampling (non-probability). Source of information: An online survey is used to collect primary data in an electronic format. The form sought data on problems, difficulties, and challenges the students face in the online mode of education following the preliminary data search from secondary data that was collected through internet-based resources.

The source of secondary data is taken from research papers, articles, journals, online sites, and other sources available on an online or offline platform. The form was WhatsApped or emailed to a cross-section of the general student population selected randomly. The survey was restricted to respondents in Goa only. The valid responses received to the online form totaled 300. The survey data was then coded and tabulated for ease of analysis using SPSS software. Descriptive statistical analysis was carried out, and on the basis of the solutions obtained, observations and insights were developed. Finally, to represent the analysis in an understandable manner, tables were prepared.

RESULT AND DISCUSSION

A. Data Analysis

Internal consistency of the research instrument used to collect data reliability tests has been undertaken, and the Cronbach's alpha is **0.918** for **17** items, which means the data is reliable to the extent of 91.8%. The extraction of common factor variances from measure sets is called exploratory factor analysis, which the present study uses to obtain factors prominent in measuring the transformational shift from offline to online digital learning. The sampling adequacy test of the K-M-O (Kaiser-Meyer-Olkin) value while performing factor analysis to confirm whether the sample size chosen for the study is adequate is 0.907. Any value above 0.70 is a good value and confirms the adequate sample size according to Kaiser and Rice (1974), and the **0.907** obtained is sufficient for a factor analysis. The table shows three factors derived from the 17 variables used, and three representative factors are given suitable names as per the group components. With a KMO of 0.907, the appropriateness of the factor analysis is confirmed. A correlation matrix that indicates whether the variables are unrelated in the Bartlett's sphericity test, in which the significance level gives the result of the test, shows that in the present study the significance level has a very small value of **0.00,** which is less than 0.05, suggesting that there is a significant variable relationship and also that variables are highly correlated.

Table 1 KMO Bartlett Test

Kaiser Meyer Olkin Measure of Adequacy Sampling.		0.907
Bartlett's Sphericity Test	Chi-Square Approx.	2739.709
	df	136
	Sig.	**0.000**

Source: Primary Data

Table 2 Rotation Sums of Squared Loadings

Component	Rotation Sums of Squared Loadings		
	Total	*% of Variance*	*Cumulative %*
1 Psychological	4.223	**24.843**	24.843
2 Technology	3.171	**18.654**	43.497
3 Personal Opinion	3.067	**18.041**	**61.538**

Source: Primary Data

Table 3 Rotated Component Matrix[a]

	Rotated Component Matrix[a]	Component		
		1	2	3
1)	I experience fear in virtual learning	0.778		
2)	I get worried during online learning	0.743		
3)	I experience anxiety during online learning	0.742		
4)	I experience hopelessness during online learning	0.699		
5)	The learning effectiveness is less online compared to face-to-face	0.671		
6)	I experience anger during online learning	0.654		
7)	Comprehension of material becomes a challenge in online	0.558		
8)	I struggle in handling the electronic gadgets during online learning		0.743	
9)	I face problem with the computer		0.731	
10)	Planning of study schedule becomes difficult in online learning		0.678	
11)	The relative learning becomes difficult in online learning		0.677	
12)	I face difficulties with the video during online learning			
13)	I see a problem in teacher and students interaction			0.747
14)	I face problems, difficulties and challenges in online mode			0.694
15)	I am being challenged with the delivery of material			0.670

16)	There is no clarity of explanation in online learning content	**0.647**
17)	I feel isolated during online classes	**0.642**

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 8 iterations.

Source: Primary Data

For challenges in this study, Principle Component Analysis (PCA) with Varimax Rotation was used. Bartlett's sphericity test (*chi-square value:* **2739.709**, p 0.05) showed inter-correlation between variables for PCA. PCA application for issues and challenges confronted by students while in digital online learning Results showed three factors having an EV > 1, which indicates a three-component solution. A total of seventeen statements were made, and the statement "*I face difficulties with the video during online learning*" didn't get a loading, so it was omitted. The psychological factor as the first factor explained a **24.843%** variance with seven variables; the second factor, the technology factor, comprised four variables and delineated **18.654**% of the variance; the third factor, the personal opinion of online learning, had five variables, i.e., and the third factor described **18.041**% of the total variance that is illustrated in Table 2. From this table, three factors have been obtained: psychological, technological, and personal opinion, with the total variance explained by the variables at **61.538**%.

A Statistical tool is used to test H0 relationship between a variable with one or more than one variables using Regression analysis.

Table 4 Summary Model

Summary Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.763[a]	0.583	**0.579**	0.624

a. Predictors: (Constant), REGR factor score   3 for analysis 1, REGR factor score   2 for analysis 1, REGR factor score   1 for analysis 1

Table 5 ANOVA[a]

ANOVA[a]

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	160.304	3	53.435	**137.438**	**0.000[b]**
	Residual	114.693	295	0.389		
	Total	274.997	298			

a. Dependent Variable: Challenges faced while learning in online mode of education

b. Predictors: (Constant), REGR factor score   3 for analysis 1, REGR factor score   2 for analysis 1, REGR factor score 1 for analysis 1

Table 6 H0 Result

H0: Challenges faced does not have a significant relationship with student's online learning during pandemic				
Dependent Variable: Challenges faced while learning in online mode of education				
Adjusted R square : 0.579		**F value: 137.438**		**P value: 0.000**
Sr No	**Independent Variable**	**Beta value**	**T value**	**Sig**
	(Constant)		**111.020**	**0.000**
1	Psychological Factor	**-.152**	**-4.039**	**0.000**
2	Technology Factor	**0.281**	**7.460**	**0.000**
3	Personal Opinion Factor	**0.694**	**18.448**	**0.000**

Source: Primary Data

The above Table 6 shows that there exists a significant relationship between the challenges faced by students in digital learning mode and the *P value,* which is quite significant at the 5% significance level. The *R square* obtained was **0.583,** indicating that the existing model is explained to the extent of **58.3%** with an F value of **137.438.** With a significant constant value, psychological, technological, and personal opinion factors are found to be significant at the 5% level of significance, so the H0 stands rejected.

CONCLUSION

In this digital transformation, where there is a shift from physical to online mode, instructional technology has played an important role as a cushion effect in terms of online learning. With hardly any prior planning and design instruction, the education system witnessed a rude shock due to the sudden pandemic, and the methods adopted in teaching and learning were a crisis response. Online learning assessed digital competency by combining elements of technology-driven learning and internet reliance with a lack of consistency in learning models and technological tool application. The shift to digital transformation provided challenges that, if factors were properly identified, could transform into opportunities at the psychological, technological, and personal growth levels. With the right internet connection, literacy, tool compatibility, and high-tech change, the problems that were found could be solved.

REFERENCES

Abad-Segura, E., González-Zamar, M.-D., Infante-Moro, J. C., & Ruipérez García, G. (2020). Sustainable management of digital transformation in higher education: Global research trends. *Sustainability*, *12*(5), 2107.

Akdemir, O., & Koszalka, T. A. (2008). Investigating the relationships among instructional strategies and learning styles in online environments. *Computers & Education*, *50*(4), 1451–1461.

Algahtani, H., Shirah, B., Subahi, A., Aldarmahi, A., Ahmed, S. N., & Khan, M. A. (2020). Perception of students about E-learning: a single-center experience from Saudi Arabia. *Dr. Sulaiman Al Habib Medical Journal*, *2*(2), 65–71.

Aminger, W., Hough, S., Roberts, S. A., Meier, V., Spina, A. D., Pajela, H., McLean, M., & Bianchini, J. A. (2021). Preservice secondary science teachers' implementation of an NGSS practice: Using mathematics and computational thinking. *Journal of Science Teacher Education*, *32*(2), 188–209.

Appleton-Knapp, S. L., & Krentler, K. A. (2006). Measuring student expectations and their effects on satisfaction: The importance of managing student expectations. *Journal of Marketing Education*, *28*(3), 254–264.

Arbaugh, J. ben. (2001). How instructor immediacy behaviors affect student satisfaction and learning in web-based courses. *Business Communication Quarterly*, *64*(4), 42–54.

Bond, M., Marín, V. I., Dolch, C., Bedenlier, S., & Zawacki-Richter, O. (2018). Digital transformation in German higher education: student and teacher perceptions and usage of digital media. *International Journal of Educational Technology in Higher Education*, *15*(1), 1–20.

Bozkurt, A., & Sharma, R. C. (2020). Emergency remote teaching in a time of global crisis due to CoronaVirus pandemic. *Asian Journal of Distance Education*, *15*(1), i–vi.

Branch, R. M., & Dousay, T. A. (2015). Welcome to Jacksonville and the 2014 AECT International Convention. *Sat*, *10*, 9–15.

Cameron, E., & Green, M. (2019). *Making sense of change management: A complete guide to the models, tools and techniques of organizational change*. Kogan Page Publishers.

Carnaghan, C., & Webb, A. (2007). Investigating the effects of group response systems on student satisfaction, learning, and engagement in accounting education. *Issues in Accounting Education*, *22*(3), 391–409.

Dziuban, C., & Moskal, P. (2011). A course is a course is a course: Factor invariance in student evaluation of online, blended and face-to-face learning environments. *The Internet and Higher Education*, *14*(4), 236–241.

Dziuban, C., Moskal, P., Kramer, L., & Thompson, J. (2013). Student satisfaction with online learning in the presence of ambivalence: Looking for the will-o'-the-wisp. *The Internet and Higher Education*, *17*, 1–8.

Francisco, G. G., Jorge, G., Oscar Martin, R., & Miquel Angel Motero, A. (2012). Gender differences in E-learning Satisfaction. *Computers & Education*, *58*(1), 283–290.

Hitz, S., & Turnoff, M. (2005). Education goes digital; the evolution of online learning and the revolution in higher education. Association for Computing Machinery. *Communication of the ACM*, *48*, 10–59.

Kara, A., & DeShields, O. W. (2004). Business student satisfaction, intentions and retention in higher education: An empirical investigation. *Marketing Educator Quarterly*, *3*(1), 1–25.

Kuo, Y.-C., Walker, A. E., Belland, B. R., & Schroder, K. E. E. (2013). A predictive study of student satisfaction in online education programs. *International Review of Research in Open and Distributed Learning*, *14*(1), 16–39.

Leszczyński, P., Charuta, A., Łaziuk, B., Gałązkowski, R., Wejnarski, A., Roszak, M., & Kołodziejczak, B. (2018). Multimedia and interactivity in distance learning of resuscitation guidelines: a randomised controlled trial. *Interactive Learning Environments*, *26*(2), 151–162.

Liu, G., & Hwang, G. (2010). A key step to understanding paradigm shifts in e-learning: towards context-aware ubiquitous learning. *British Journal of Educational Technology*, *41*(2), E1–E9.

Muhammad, A., Shaikh, A., Naveed, Q. N., & Qureshi, M. R. N. (2020). Factors affecting academic integrity in E-learning of Saudi Arabian Universities. An investigation using Delphi and AHP. *Ieee Access*, *8*, 16259–16268.

Richardson, J. C. (2001). *Examining social presence in online courses in relation to students' perceived learning and satisfaction*. State University of New York at Albany.

Sáiz-Manzanares, M. C., Marticorena-Sánchez, R., Arnáiz-González, Á., Pastor, J. F. D., & Rodríguez-Arribas, S. (2019). Blended learning: an experience with infographics and virtual laboratories using Self-regulated learning. *INTED2019 Proceedings*, 2966–2971.

Sandkuhl, K., & Lehmann, H. (2017). *Digital transformation in higher education–The role of enterprise architectures and portals*.

Strielkowski, W. (2020). COVID-19 pandemic and the digital revolution in academia and higher education. *Preprints*, *1*, 1–6.

Swan, K. (2002). Building learning communities in online courses: The importance of interaction. *Education, Communication & Information*, *2*(1), 23–49.

Tang, M., & Byrne, R. (2007). Regular versus online versus blended: A qualitative description of the advantages of the electronic modes and a quantitative evaluation. *International Journal on E-Learning*, *6*(2), 257–266.

Vlachopoulos, D. (2011). COVID-19: Threat or opportunity for online education? *Higher Learning Research Communications*, *10*(1), 2.