# MODELLING LEARNING TYPOLOGY AND ACADEMIC PERFORMANCE DURING COVID-19 LOCKDOWN

Shahzad Farid<sup>\*</sup>

Assistant Professor, Department of Sociology, University of Okara. <u>s.farid@uo.edu.pk</u>

Hafiz Muhammad Arshad Assistant Professor, Department of Teacher Education, University of Okara. <u>Hafiz.arshad@uo.edu.pk</u>

## Samina Yaqoob

M.Phil. Scholar, Department of Sociology, University of Okara. <u>Saminayaqoob10@gmail.com</u>

## ABSTRACT

This study aimed to identify the learning typology during the COVID-19 lockdown in Europe and Asia and the effects of this learning classification on the academic performance of university students. We interviewed 584 students from different Asian and European universities through online survey method. The exploratory factor analysis identified three types of learners during the lockdown i.e., conventional, virtual, and virtually experiential learners. The structural equation modelling revealed that the virtual and virtually experiential learners performed better in universities than conventional learners during the lockdown. The study also explored the higher academic performance of female virtual learners than male virtual learners. However, male virtually experiential learners have two times higher academic performance than female virtually experiential learners. The study suggests exploring the effects of this learning typology in blended and traditional educational systems.

Keywords: Academic performance, Internet, Online learning, students, traditional learning, University

## INTRODUCTION

During the COVID-19 lockdown, human interaction was widely transformed from direct to indirect interaction which enforced a higher dependency on information and communication technology (Huda et al., 2018). The educational institution was not an exception. The use of digital devices like smartphones, laptops, and tablets has increased considering an emergency shift from the traditional mode of teaching and learning to the digital mode of teaching and learning (Addae, Amponsah, & Gborti, 2022; Maqableh & Alia, 2021). Such a shift makes every student familiar with the term online learning which facilitates them to continue their studies (Mustafa et al., 2021). Salamat, et. al. (2018) stated that through online learning, students are unable to complete their courses or degree while staying at home. Currently, online learning the whole world become an indispensable source of learning.

Information and communication technology become a fast, easy and indispensable source of learning at the university level in the last two decades. It just has taken a central place in the mode of learning and become one of the best methods compared with the Chalk and Talk method (Yeboah & Smith, 2016). During the last decade, a number of universities in the world introduced various online courses which were easy to reach for students (Aikina & Bolsunovskaya, 2020). The period of 1900s and 2000s is a perfect growth time for online learning in the education system, and it always seems like a good source of alternative to the conventional style of learning, but it is not a consistent source of education (Ribeiro, 2020). To control the pandemic in 2020, World Health Organization (WHO) clearly notified the social distancing policy that led to the unpredicted disorder in conventional learning (Adedoyin & Soykan, 2020; Mirkholikovna, 2020).

This study aimed to model learning during COVID-19 lockdown and to explore its effects on the academic performance of students. Although, previous studies attempted to explore this relationship

<sup>\*</sup> Corresponding Author

yet experiential learning in comparison with virtual experience and conventional learning was not studied. This study used a structural equation model to identify such differences in the modelling equation.

## MODELLING LEARNING AND ACADEMIC PERFORMANCE

Currently, online learning has expanded to assist students in studying procedures (Yokoyama, 2019). Salamat, et. al. (2018) asserted that online learning gives relaxation time and without any help, inspires students to perform their tasks about their studies. Students who are taking online classes, experience ease while using the internet and browsing data in spite of taking face-to-face classes. Suresh, Vishnu, and Gayathri (2018) suggested that online study is useful for the educational outcomes of students because a conventional study is costly and takes much time to learn as students have to go to college daily to spend a lot of time and money while the online study provides an unconventional, quick and economically better way of learning which can be easily available at low cost everywhere for everyone. Contrarily, Alawamleh, Al-Twait and Al-Saht (2020) found a large number of students favor the lecture room over online classes, they face many issues in online classes like problems in understanding material, lack of emotional support, feelings of empathy, and lack of communication between teacher and learner which is very necessary for learning.

The purpose of online study is to provide knowledge, connection, and atmosphere of the class as in the real-world to construct students' study involvement more significantly, which can help them to stay connected with teachers and students during class. The main concern of teachers is to provide command of relevant subjects to students to build a relationship of mentor and learner, but it becomes difficult in case of online atmosphere. The fact behind such online classes is the absence of body gestures and facial expressions (Alawamleh, Al-Twait & Al-Saht, 2020) which provide an extra guide in understanding the subject.

Xu and Jaggars (2013) conducted a huge study in Washington DC and found that all kinds of students are facing the problem of slow learning in online courses. Students with below-average scores, and students like males, young and black try harder than others to adjust themselves to an online learning environment. According to them, in online circumstances, two knowledge domains are tough for learners. One is social sciences and the other one is applied sciences. Because these disciplines demand a high level of presentation and convention it is not possible for teachers to teach online successfully as the teaching techniques in these domains demand in depth connection of teachers and learners for the exchange of views. Similarly, Mahdy (2020) In spite of the fact that online learning gives a golden chance for self-education to students in any geographical area, the main issue is that it is not applicable in medical science to provide practical lectures because major subjects are practical so that it is not possible to acquire knowledge online. In the opinion of students, it is very tough to come up with medical proficiency with an online stud system.

Martin and Bolliger (2018) stated that learner-to-learner group utilization of online devices remained a very helpful engagement policy while discussing and working collectively. Online learning remained helpful in teacher-to-student categorization but in the relationship of students to books, students remarked working in the real world and having discussions with complex questions are very helpful.

Considering the findings and suggestions of the previous studies, we devised a model of learning typology and academic performance (Fig. 1a). The model states that

- i. Conventional and virtual learning environments are opposite to each other.
- ii. Each environment demands homogenous learning prowess from its subjects which are heterogeneous in comparison. However, both environments are interconnected considering 'learning' as their core element.
- iii. Therefore, the supporting learning skills of each environment increase the academic performance of its subjects.
- iv. However, the motivated subjects are highly likely to transit from one environment to another by experiencing the alternative (Fig. 1b).

v. experiential learning is the key to a transitive learning environment.



Fig 1a. The contrary association of virtual and conventional learning environments

Fig 1b. The transition of a subject across learning environments

We hypothesized that virtual learning (VC) is the strongest predictor of higher academic performance than conventional and virtually experiential learning because the VL has the highest probability of possessing the supporting skills for the virtual learning environment. Although VEL could also have a positive association with academic performance, considering its experiential state, it can also be hypothesized that such learners would have relatively lower skills at their disposal which produce comparatively lower academic performance than the VL. Therefore, the finalized model (Fig. 1c) showed an association of the typified learners with academic performance.



Fig 1c. The association model of learning typology and academic performance

#### MATERIAL AND METHODS Participants and Research Setting

The study used the quantitative research approach. The data was collected using an online survey method between August 01 to September 01, 2021. The data was collected from the students of different countries in Asia and Europe. The sample size of the study was 700 students. The study used an equal proportionate sampling technique for data collection by which 350 filled questionnaires were supposed to be received from each selected region i.e., Asia and Europe. However, we received 584 responses (83.43% response rate) from Asia (n = 332, 56.85%) and Europe (n = 252, 43.2%). The distribution of the sample size is given in table 1.

# Measurement

We devised a tool for learning typology (LT) and academic performance (Table 2) considering the previous review of the literature. The LT comprised 10 items which were measured on five points likert scale from 1 = strongly disagree to 5 = strongly agree. The LT comprised three factors of learning i.e., conventional learner (four items), virtual learner (three items), and virtually experiential learner (three items). The learning typology tool was constructed using the review of literature specifically online and conventional learning studies. The reliability statistics of the tool were satisfactory i.e., Cronbach's Alpha = 0.739 (items = 10).

Continents	Countries name	Proposed responses (%)	Responses (%)
Asia	<b>Pakistan:</b> 9 HEC recognized universities <b>China:</b> 9 universities under Ministry of Education (MOE) <b>India:</b> 9 universities under UGC (University Grant Commission)	350 (50%)	332 (56.85%)
Europe	<b>France:</b> 9 universities under Ministry of National Education <b>Germany:</b> Federal Ministry of Education and Research	350 (50%)	252 (43.2%)
	Total	700	584 (83.43%)

The academic performance (AP) of the students was measured by four items e.g., I complete my assignments in time, ranging from 1 = strongly disagree to 5 = strongly agree. The reliability statistics of the tool were satisfactory i.e., Cronbach's Alpha = 0.721 (items = 04).

## Factors identification and tool confirmation

Table 2 comprised the results of the exploratory factor analysis (EFA) of the learning scale. The results of Kaiser-Meyer-Olkin Measure of Sampling Adequacy = 0.742, and Bartlett's Test of Sphericity = Approx. Chi-Square = 622.768 (df = 45) p = .000, are satisfactory. The EFA produced three factors i.e., Conventional learners, virtual learners, and virtually experiential learners. Conventional learners are learners who have problems with online learning. Virtual learners are learners who are comfortable with online learning. The virtually experiential learners are the learners who adapted to online learning and improved their skills. The factors contributed 57.63% of the variance in the data. **Table No. 2 Exploratory factor analysis on learning scale** 

Items	Virtual Learner	Virtually experiential learning	Conventional learning
Online classes make me confident to do my work			
Online classes provide met time relaxation			
My learning increases about subject in online classes 0.			
I feel comfortable during online classes	0.689		
Online learning introduced me new virtual experiences		0.814	
My computer skills are low		0.769	
I am attempting to learn online learning method		0.709	
I feel uncomfortable during online classes			0.815
During online class, my understanding about subject became		0.635	
I learn better by physically present in classes		0.600	
Notes forten loading loss than 0.50 is summand			

Note: factor loading less than 0.50 is suppressed.

The fit indices of confirmatory factor analysis showed the satisfactory fit of the model, Chi-Square = 87.423(32), p < .05, GFI = 0.971, AGFI = 0.951, PGFI = 0.565, CFI = 0.942, RMR = 0.071, RMSEA = 0.05 (Fig. 2, generated in AMOS).



Fig 2. Confirmatory factor analysis of the learning factors. Note: VL = Virtual learner, VEL = Virtually experiential learner, CL = Conventional Learner

# RESULTS

Table 3 comprised the frequency and percentage distribution of the demographic profile of the respondents. The table showed that the majority of the respondents were females (64.1%) and were within the age group of 15-25 years. The participation of the postgraduate students was lower (20.1%) than graduate students (79.9%). Interestingly, the percentage of medical students of (40.1%) was higher than Law (7.6%), natural sciences (10.9%), linguistics (2.1%), and social sciences (25.5%).

Table No. 3 Demographic profile of the respondents						
Variables	Frequency	Percentage				
Age						
15-25	481	82.4				
26-35	90	15.4				
36+	13	2.2				
Gender						
Male	212	36.6				
Female	372	63.7				
Education level						
Graduation	463	79.3				
Post-Graduation	121	20.7				
Type of program						
Medical Doctor	229	39.2				
Law	49	8.4				
Natural sciences	64	11.0				
Social Sciences	150	25.7				
Linguistics	13	2.2				
Others	79	13.5				
Total	584	100.0				

We tested three structural equation models (SEM) comprising AP of students. The initial two models were tested by gender disparity i.e., male (n = 212) and female (n = 372). The last model includes the total sample (n = 584). All graphical models of SEM were generated in AMOS.

The SEM of male students showed that the model fit to the data, Chi-Square = 423.727(142), p<.05, GFI = 0.905, AGFI = 0.856, PGFI = 0.612, CFI = 0.796, RMR = 0.126, RMSEA = 0.058 (Fig. 3a). Similarly, the fit indices of female students were also satisfactory, Chi- Square = 423.727(142), p<.05, GFI = 0.905, AGFI = 0.856, PGFI = 0.612, CFI = 0.796, RMR = 0.126, RMSEA = 0.058 (Fig. 3b). The unstandardized estimates of the male and female models showed that the VL is a slightly stronger predictor of AP for females ( $\beta = 0.35$ , p<.05) than males ( $\beta = 0.31$ , p<.05). However, the VEL has almost double unstandardized estimates to predict AP among males ( $\beta = 0.32$ ) than females ( $\beta = 0.19$ ), but it is not significantly predicted the outcome (p>.05). Although the CL is negatively associated with AP in both male and female models, it also has no significant association in both SEM models.

The fit indices of the total sample SEM model (Fig. 4) also satisfactorily fit with the data, GFI = 0.927, AGFI = 0.893, PGFI = 0.627, CFI = 0.821, RMR = 0.095, RMSEA = 0.076 and Chi-Square = 310.963(71), p<.05. The unstandardized estimates of the model showed that the virtual learners (VL) ( $\beta$  = 0.34, p<.05) and virtually experiential learners ( $\beta$  = 0.21, p<.05) are positively associated with the academic performance of the students. However, conventional learners have no significant association with the academic performance of students (p>.05).

Conventional learners are those students who have not adapted to online learning methods and have problems with learning online. These students are not computer friendly and have poor online learning skills. They have usually printed book readers. On the other hand, virtual experiential learners are those students who have all the qualities of conventional learners, but they have higher adaptability to the changing learning environment. In the context of the COVID-19 pandemic, those students who attempted to adapt to online learning and increased their computer and internet-using skills for learning are the virtually experiential learners. Their fundamental characteristic is to learn by experiencing things. Therefore, they have higher flexibility and adaptability, which is contrary to conventional learners because they have lower flexibility and adaptability.



Fig 3a. Structural equation model of learning factors and academic performance of male students



## DISCUSSION

The study attempted to measure the effects of various types of learning during the COVID-19 pandemic on the academic performance of students. The explored typology of learning/learners during the COVID-19 pandemic revealed that only virtual learning significantly affected the academic performance of students. Although online learning reduced the academic performance of students (Mahdy, 2020), various studies suggested it during the pandemic because it is manageable and easy to access (Mukhtar et al., 2020). Our findings supported several recent studies (Han, & Ellis, 2021; Bravo-Agapito, Romero & Pamplona, 2021) which examined the recommendations of Mukhtar, et. al. (2020). However, some countries have internet accessibility problems where the results were contrary such as some studies from India, Bangladesh and Pakistan affirmed that online learning has negative effects on the academic performance of students due to lack of internet accessibility (Humbhi, 2021; Shakoor, Fakhar, & Abbas, 2021; Muthuprasad et al., 2021; Roy et al., 2021).

Other than the lack of internet accessibility, students also have little technological prowess to adapt to online learning (Adnan & Anwar, 2020; Agustina & Cheng, 2020). We label such students as conventional learners because the balance between learner characteristics and technical skill is required (Dabbagh, 2007) for a satisfactory academic performance during the online learning method.

Conventional learners had difficulties in online learning due to their lack of adaptability to changing learning methods. Aguilera-Hermida (2020) explored that the majority of the students



Fig 4. Structural equation model of learning factors and academic performance

considered online learning an unpleasant experience. They had a negative attitude toward online learning, and they were unsuccessful during the challenges of online learning. Similarly, this study also found that conventional learners were unable to deal with the challenges of online learning because they were unable to improve or sustain their academic performance during online learning. This finding supported other studies such as Adnan and Anwar (2020) explored that other than the connectivity issues, 78.6% of the respondents preferred the conventional learning method.

Although, it was reported that students were prepared for online learning methods (Bovermann, Weidlich & Bastiaens, 2018; Martin, Stamper & Flowers, 2020) yet they were struggling to learn new software that universities used e.g., Moodle (Mpungose, 2020). Such pseudo-technical skills divide learners into two categories. First, who are motivated to adapt to the online learning methods, and second, who are not motivated and have a negative attitude toward online learning methods. The latter are those students whom we labeled virtually experiential learners (VEL). These students lack virtual expertise, but they are motivated to learn by experiencing the virtual world. We extracted this dimension of learning from experiential learning theory.

The theory stated that students learn by doing (McCarthy, 2010; Kolb, Boyatzis & Mainemelis, 2014; Colombari, D'Amico & Paolucci, 2021). Some Previous studies affirmed that experiential learning is highly likely to increase the conceptual ability and academic performance of student (Leal-Rodriguez & Albort-Morant, 2019; Gittings, Taplin & Kerr, 2020). We used the experiential learning theory in the virtual domain with the concept that virtual experience is also highly likely to increase the online learning of the students which is (hypothetically) determined by its positive effect on academic performance. However, this hypothesis was not supported among male and female students' models. On the contrary, the final model supported this hypothesis. We proposed that those students who are motivated to learn online, regardless of their readiness and lack of technical skills, are highly likely to adapt to the virtual environment by experiencing it which positively affects their academic performance. The data supported this hypothesis. Previous studies also supported this hypothesis. An experimental study by Lamb, et. al. (2019) explored that the virtual experience increases the writing skills of those students who had, previously, textbook reading experience. Similarly, Villena, et. al. (2022) the experiment of learning history through virtual experience on primary-level students also affirmed that virtual experience had significantly higher learning outcomes than traditional learning outcomes.

## CONCLUSION

The study aimed to explore the effects of learning typology on the academic performance of students during COVID-19 lockdown, for the learning typology tool was devised that produced three types of learning/learners i.e., conventional, virtual, and virtually experiential learning/learner. The study concluded that during COVID-19 lockdown, virtual and virtually experiential learners were able to perform better in academics than the conventional learner. The study also supported experiential learning theory in the virtual domain as the VEL is significantly positively associated with the academic performance of students.

The study suggests that future studies may use the learning typology in the blended and traditional learning environment after the lockdown. The study also recommends a zero-credit hour course on online learning training both in the blended and online learning environment for students in order to improve their skills which will potentially contribute to examining the learning outcome based upon the conceptual ability of students instead of a mediator skill i.e., virtual skill.

## REFERENCES

- Addae, D., Amponsah, S., & Gborti, B. J. (2022). COVID-19 Pandemic and the Shift to Digital Learning: Experiences of Students in a Community College in Ghana. *Community College Journal of Research and Practice*, 46(1-2), 101-112.
- Adedoyin, O. B., & Soykan, E. (2020). Covid-19 pandemic and online learning: the challenges and opportunities. *Interactive learning environments*, 1-13.
- Adnan, M., & Anwar, K. (2020). Online Learning amid the COVID-19 Pandemic: Students' Perspectives. *Online Submission*, 2(1), 45-51.
- Aguilera-Hermida, A. P. (2020). College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open*, *1*, 100011.
- Agustina, P. Z. R., & Cheng, T. H. (2020). How students' perspectives about online learning amid the COVID-19 pandemic?. *Studies in Learning and Teaching*, *1*(3), 133-139.
- Aikina, T., & Bolsunovskaya, L. (2020). Moodle-based learning: Motivating and demotivating factors. *international journal of emerging technologies in learning (iJET)*, 15(2), 239-248.
- Alawamleh, M., Al-Twait, L. M., & Al-Saht, G. R. (2020). The effect of online learning on communication between instructors and students during Covid-19 pandemic. *Asian Education and Development Studies*.
- Bovermann, K., Weidlich, J., & Bastiaens, T. (2018). Online learning readiness and attitudes towards gaming in gamified online learning–a mixed methods case study. *International Journal of Educational Technology in Higher Education*, 15(1), 1-17.
- Bravo-Agapito, J., Romero, S. J., & Pamplona, S. (2021). Early prediction of undergraduate Student's academic performance in completely online learning: A five-year study. *Computers in Human Behavior*, *115*, 106595.
- Colombari, R., D'Amico, E., & Paolucci, E. (2021). Can challenge-based learning be effective online?

A case study using experiential learning theory. *CERN IdeaSquare Journal of Experimental Innovation*, *5*(1), 40-48.

- Dabbagh, N. (2007). The online learner: Characteristics and pedagogical implications. *Contemporary Issues in Technology and Teacher Education*, 7(3), 217-226.
- Gittings, L., Taplin, R., & Kerr, R. (2020). Experiential learning activities in university accounting education: A systematic literature review. *Journal of Accounting Education*, 52, 100680.
- Han, F., & Ellis, R. A. (2021). Predicting Students' Academic Performance by Their Online Learning Patterns in a Blended Course. *Educational Technology & Society*, 24(1), 191-204.
- Huda, M., Maseleno, A., Atmotiyoso, P., Siregar, M., Ahmad, R., Jasmi, K., & Muhamad, N. (2018). Big data emerging technology: insights into innovative environment for online learning resources. *International Journal of Emerging Technologies in Learning (iJET)*, 13(1), 23-36.
- Humbhi, S. (2021). Measuring the Impact of ICT on Students' Academic Performances: Evidence from Higher Educational Institutions of the Remote Areas of Pakistan.
- Kolb, D. A., Boyatzis, R. E., & Mainemelis, C. (2014). Experiential learning theory: Previous research and new directions. In *Perspectives on thinking, learning, and cognitive styles* (pp. 227-248). Routledge.
- Lamb, R. L., Etopio, E., Hand, B., & Yoon, S. Y. (2019). Virtual reality simulation: Effects on academic performance within two domains of writing in science. *Journal of Science Education and Technology*, 28(4), 371-381.
- Leal-Rodriguez, A. L., & Albort-Morant, G. (2019). Promoting innovative experiential learning practices to improve academic performance: Empirical evidence from a Spanish Business School. *Journal of Innovation & Knowledge*, 4(2), 97-103.
- Mahdy, M. A. (2020). The impact of COVID-19 pandemic on the academic performance of veterinary medical students. *Frontiers in veterinary science*, 7, 594261.
- Maqableh, M., & Alia, M. (2021). Evaluation online learning of undergraduate students under lockdown amidst COVID-19 Pandemic: The online learning experience and students' satisfaction. *Children and Youth Services Review*, 128, 106160.
- Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. *Online Learning*, 22(1), 205-222.
- Martin, F., Stamper, B., & Flowers, C. (2020). Examining Student Perception of Readiness for Online Learning: Importance and Confidence. *Online Learning*, 24(2), 38-58.
- McCarthy, M. (2010). Experiential learning theory: From theory to practice. *Journal of Business & Economics Research (JBER)*, 8(5).
- Mirkholikovna, D. K. (2020). Advantages and disadvantages of distance learning. *Наука и образование сегодня*, 7(54), 70-72.
- Mpungose, C. B. (2020). Is Moodle or WhatsApp the preferred e-learning platform at a South African university? First-year students' experiences. *Education and information technologies*, 25(2), 927-941.
- Mukhtar, K., Javed, K., Arooj, M., & Sethi, A. (2020). Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era. *Pakistan journal of medical sciences*, 36(COVID19-S4), S27.
- Mustafa, F., Khursheed, A., Rizvi, S. M. U., Zahid, A., & Akhtar, A. (2021). Factors influencing online learning of university students under the covid-19 pandemic. *IJERI: International Journal of Educational Research and Innovation*, (15), 342-359.
- Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2021). Students' perception and preference for online education in India during COVID-19 pandemic. *Social Sciences & Humanities Open*, *3*(1), 100101.
- Ribeiro, R. (2020). How university faculty embraced the remote learning shift. EdTech Magazine.
- Roy, A. K., Mou, S. I., Kabir, H., & Kamrul, M. (2021). The aftermaths of prolonged academic institutions' closure due to COVID-19 in Bangladesh: time to reopen safely. *Bioresearch Communications-(BRC)* 7, 1038-1041.
- Salamat, L., Ahmad, G., Bakht, M. I., & Saifi, I. L. (2018). Effects of e-learning on students' academic learning at university level. Asian Innovative Journal of Social Sciences and Humanities, 2(2), 1-12.
- Shakoor, F., Fakhar, A., & Abbas, J. (2021). Impact of smartphones usage on the learning behaviour

and academic performance of students: empirical evidence from Pakistan. Int. J. Acad. Res. Bus. Soc. Sci, 11, 862-881.

- Suresh, M., Vishnu Priya, V., & Gayathri, R. (2018). Effect of e-learning on academic performance of undergraduate students. *Drug Invention Today*, *10*(9).
- Villena Taranilla, R., Cózar-Gutiérrez, R., González-Calero, J. A., & López Cirugeda, I. (2022). Strolling through a city of the Roman Empire: an analysis of the potential of virtual reality to teach history in Primary Education. *Interactive Learning Environments*, *30*(4), 608-618.
- Xu, D., & Jaggars, S. (2013). Adaptability to online learning: Differences across types of students and academic subject areas.
- Yeboah, A. K., & Smith, P. (2016). Relationships between minority students online learning experiences and academic performance. *Online Learning*, 20(4), n4.
- Yokoyama, S. (2019). Academic self-efficacy and academic performance in online learning: A mini review. *Frontiers in psychology*, *9*, 2794.