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ASSESSMENT OF STUDENT'S ACADEMIC ACHIEVEMENTS IN ONLINE AND FACE-TO-FACE LEARNING IN HIGHER EDUCATION

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Abstract

During the current emergency of Pandemic disease of Covid-19, the importance of online learning strategy has much increased due to closure of schools, colleges and universities in most part of the globe. To evaluate the effectiveness of online learning, a statistical study has been conducted on the academic achievements of postgraduate students learned by online versus face-to-face learning modes. The statistical analysis of academic achievements of postgraduate students has been done by SPSS-20 statistical tool. The t-test analysis showed that the t-value was 0.549 and p-value was 0.583. The significance level for t-test analysis was 0.05. As, the p-value was more that 0.05 ($p>0.05$) so, no significant relation has been found in the academic achievements of the students learned by online and face to face modes of learning. The null hypothesis (Ho) was proved true and the alternative hypothesis (H1) rejected. The reasons for no significant relation were abruptly shifting of learning modes from face to face to online, slow working of LMS accounts due to over burden, login and voice problems during the online classes. Overall, the students performed better in the online modes of learning. Some students performed good in face-to-face learning and performed poor in online modes of learning. So, to generalize, it is necessary to do more research on online modes of learning under regional context.

Keywords – Effective learning, Statistical analysis, Postgraduate students, Technological tools.

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1. Introduction

Learning is a primary requirement of humanity and develops the imperative life skills in an individual (Hafeez, Kazmi, Tahira, Hussain, Ahmad, Yasmeen et al., 2020). From the beginning of 21st century, the modes of learning have been changed. Now the traditional or face-to-face learning have been transferred into blended or online learning. Online learning is also called as e-learning (Saira, Ajmal & Hafeez, 2021). The sudden outbreak of Covid-19 in China in 2019 has totally changed the modes of teaching-learning process in schools, colleges and universities. Most of the universities have to change the learning modes

from face-to-face to online learning (Hafeez, Ajmal & Kazmi, 2021). E-learning has significantly become an effective learning method with multiple academic settings due to application of various web-based tools in learning process. The teaching-learning process in e-learning includes the usage of ICT to improve efficiency of teaching-learning process (Ananga & Biney, 2017). The application of technology in higher educational system developed the new and active teaching-learning methods and replaced the traditional or face-to-face learning to blended or online learning (Paudel, 2021).

Online learning has been made possible by the rapid advancement of information and technology. Learners who are studying at a distance are typically able to use computers connected to a network, allowing them to learn at any time and from any location (Acosta-Tello, 2015). Online learning and teaching is a technique of enhancing the learning-teaching process by utilizing a range of student-centered, sophisticated, and even internet-based equipment to deliver learning experiences in a modern or asynchronous setting (Yang & Li, 2018). Learners may engage in online lectures, teachers and students can have direct interactions, and quick answers are feasible in an effective learning-teaching environment. Learning resources are not accessible as a live learning process in such a learning-teaching setting, but they are available in various learning management systems. It is impossible to respond quickly and immediately in such an atmosphere (Littlefield, Rubinstein & Laveist, 2019). Social communication opportunities abound in today's classrooms. In this lethal infection, the proliferation of such internet venues is critical (Basilaia & Kvavadze, 2020).

Due to increase in the application of ICT across the globe, it became necessary requirement for the educational institutions especially higher educational institutions to change and improve the learning environments and to cope with increasing demand of skilled persons for learning and training (Soffer & Nachmias, 2018). With the advancement of ICT, the acquisition of knowledge has been increased by online modes of learning. The computer laptops, mobiles and internet are used in e-learning (Tossy, 2017). The implementation of e-learning in higher educational institutions has a lot of advantages of time flexibility and space for large number of learners. This learning strategy has the ability to access and share huge amount of information and knowledge with little effort and in short time duration (Adnan & Anwar, 2020). Some other benefits of e-learning are (i) low-cost learning process as the learners don't need to move and travel daily (ii) A smaller number of buildings and faculty members are required in e-learning educational process (Abaidoo & Arkorful, 2014).

The traditional learning approach is generally said to a teacher-centered learning approach, which is endorsed with little communications between the intstrcutors and the learners. The instructor served as the propagator of knowledge, distributing the information for most of the time in classroom. During the lecture, the instructor spends most of the time in presenting new information. So, lack of communication among instructor and learners occurs. The learners then complete the task allotted by instructor after class (Saira et al., 2021). The framework for traditional or face to face learning is shown in Figure 1.

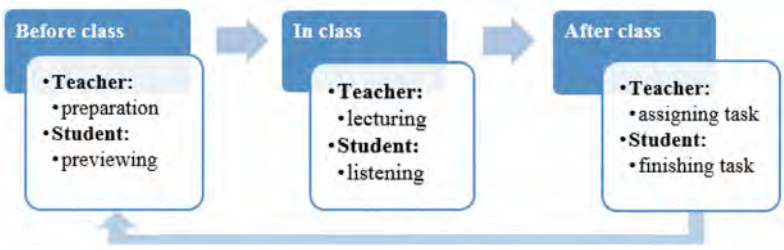

Figure 1. Structural Framework for Face to Face Learning Approach

Blended learning or online learning is the integration of computer and internet in traditional learning approaches with online activities. The learning management system (LMS), Zoom meeting software or skype can be used for the online learning approach. The instructor usually upload the learning materials on the LMS account before the face-to-face classroom. The learners read the learning materials before the

class. The quizzes, examination and viva-voice are conducted in online modes (Hafeez et al., 2021). The structural framework of blended or online learning approach is shown in Figure 2.

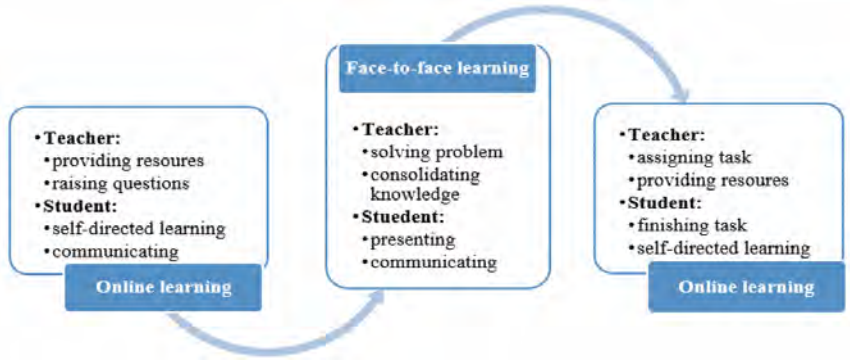

Figure 2. Structural Framework of Online Learning Approach

A number of studies have been done to compare the learning outcomes of traditional or face to face and online learning environments (Dumford & Miller, 2018; Han & Ellis, 2019; Hibbi, Abdoun & El Khatir, 2021; Hodges, Moore, Lockee, Trust & Bond, 2020; Kebritchi, Lipschuetz & Santiague, 2017). All these studies proved the importance of online learning modes in higher education. So, by keeping in mind the value of online learning the objective of current study is to assess the student's academic achievements in online versus face-to-face modes of learning of postgraduate students in educational courses in higher educational institute.

2. Review of Literature

2.1. E-Learning or Online Learning

Distance learning has been made easier by the rapid growth of information and communication technologies. Students learning at a distance are typically capable of using computers or laptops connected to a network system, allowing them to learn at any time and from any location (Al-Juda, 2017). In order to increase learning via the variety of learner-centered, creative and even internet-based instruments, online learning is regarded as a method that provides the learning experience in a modern and asynchronous environment (Babović, 2017; Yang & Li, 2018). The efficient and effective environment is designed to allow students to participate in online study and lectures, direct connection between instructors and learners and quick feedback on online learning. Learning resources are not immediately accessible in such a learning environment, as they are available in many learning management systems in face-to-face learning processes. (Smith, Hoderi & Mcdermott, 2019). Online learning has to be quickly altered; thus, in such exciting conditions Google product is undoubtedly beneficial, including Open board, Google Hangout, Calendar, G-Drive, Google Form and Gmail. The efficient and successful usage of this software is a substitute for face-to-face education (Basilaia & Kvavadze, 2020).

Boelens, De Wever and Voet (2017) conducted a study to evaluate the effectiveness of online learning against face-to-face learning in an undergraduate class of statistical course. The results of the study indicated that no significance difference has been found in the learning outcomes of students learned by face-to-face and online modes. Singh and Thurman (2019) conducted a research to explore the impacts of online learning for university students in information and communication technology course by applying LMS. The consequences of the study revealed that the learner's academic grades were better in online learning as compared to the face-to-face learning. Khader (2016) investigated in a research that blended or online learning had the enough potential to increase the learning efficiency of university students. Harsasi and Sutawijaya (2018) conducted a research to find the challenges for the implementation of online learning in higher educational institutions in Indonesia. They found that technical skills and economy are the main hurdles in the implementation of E-learning in higher educational institutions.

2.2. Online Learning is the Need of Time

Due to the catastrophic Covid-19 outbreak, a huge section of the planet is in captivity, and many cities around the world have become ghost cities. Covid-19 has influenced the universities, institutions, and schools. The Coronavirus has spawned businesses dedicated to facilitating the transition from offline to online learning. This problem is causing firms who were previously hesitant to adopt contemporary technologies to change their minds. The intriguing flank of internet education is shown in this catastrophe. We may communicate with a big number of students any time and everywhere in the globe by means of online learning methods. Organizations should investigate other ways to learn and educate online, and try to practise IT more properly. With the appalling need for the current scenario in mind, several institutions, colleges and universities across the world have fully digitalized their operations. In the middle of this turmoil, online work becomes a winner. Therefore, in this hazardous circumstance, it is necessary to improve the value of online learning and teaching. Following the introduction of Covid-19, online education at Chinese colleges has increased rapidly. Overnight, instructors modified their whole teaching approach from regular classrooms, in other words, to meet new conditions and to adapt to different scenarios. The classrooms have transformed. At present, the question is not whether online learning and teaching can offer a quality leaning system, but how schools can use online learning to such an extent (Carey, 2020). Opposition to change globally supports no education sector. They are evaluated by their capacity, in such a short time, to receive and sustain quality. The education sector's reputation is under threat and under study. It demonstrates their capacity to sustain education quality in the middle of this crisis. The distance, the degree of education and personal motivation in learning and practice are the 3 major criteria for online learning. Advanced organizational strategies can assist us to address this outbreak of Covid19 (Liguori & Winkler, 2020). In such tough circumstances, Google tools like Open Board, Calendar, Google Hangout, G-Drive, G-mail and Google Form are quite useful. These applications can be used as an alternative to face-to-face education (Basilaia & Kvavadze, 2020).

2.3. Pakistan's Online Learning and Teaching System

Under the pandemic Covid-19 circumstances, a research study was done by Adnan and Anwar (2020) and assessed the attitude of Pakistani graduate and postgraduate students toward digital and distance education. According to the findings of the study, online education in impoverished countries such as Pakistan may not produce the desired outcomes since many learners are unable to access the internet owing to economical and technical issues. In digitally developed nations (Basilaia & Kvavadze, 2020), online learning is beneficial, but it is extremely difficult to adopt in poor countries like Pakistan. However, in Pakistan, substantial teaching and learning activities of educational organizations are manually controlled (Salam, Jianqiu, Pathan & Lei, 2017). The lack of access to fast, affordable, and regular internet connections impedes the growth of online learning, particularly for learners residing in remote parts of Pakistan (Shehzadi, Nisar, Hussain, Basheer, Hameed & Chaudhry, 2021). Modification of online education and new level of administrative agility has become unprecedented (Wu, 2020), with many educational institutions focused primarily on transferring educational material into the digital medium. The capacity to engage in digital education is nevertheless indicated by the failure to provide students with resources and to achieve social exclusion at schools, as well as the absence of proper access and access to the internet and the newest technology (Zhang, Wang, Yang & Wang, 2020). Unlike regular digital learning circumstances, it is more catastrophe learning. The conditions are extraordinary. Lessons are greatly needed to improve their curriculum and implement new ways to education and policy (Pace, Pettit & Barker, 2020). For municipal activities and contributions, educational organizations are also significant factors. If instructional activities halt, many children and young people will lose the community behaviors needed to develop and learn (Joosten, Lee-McCarthy, Harness & Paulus, 2020).

Much researches in Pakistan on the difficulties and potential of online learning has been carried out in a common environment (Fareed, Ashraf & Bilal, 2016) where learning, education and the integration of E-learning cycles are not necessary. Very few national educational institutions were using this technology before the Covid-19. In the past, certain Pakistani educational research have shown good outcomes in distance learning. The relationship between educators and distance learners is satisfactory, the curriculum is well-designed and up-to-date, the instructors are devoted to, qualified and knowledge-intensive training

(Ali & Ahmad, 2011). The present scenario is nevertheless quite different from regular remote learning programs in which all universities throughout Pakistan are expected, regardless of their low resources and financing, to apply their teaching methods.

2.4. Learning Theory Followed in this Study by the Students in Online Learning

The behavioristic approach to instructional design for online learning begins with the core assumption of behaviourism that information is objective, implying that there is only one correct response to provide or a certain strategy to follow. Although this may appear rigid–and it may be–here is where eLearning professionals should begin to become aware of the kind of activities for which a behavioristic approach may be suitable. It also demonstrates that behaviourism may not be the best strategy for eLearning activities that need the user to learn higher-order abilities, such as decision-making or problem-solving, by analyzing, synthesizing, or evaluating the information given.

2.4.1. Techniques to be Used for the Instructional Design of Behavioristic Online Learning Activities

Once it has been decided that a behavioristic approach is appropriate for meeting the specific learning objectives of an online learning course, the eLearning activities must be designed accordingly. The following are the techniques that were used:

2.4.1.1. Discrimination

When a learning aim needs learners to determine if a notion belongs to a certain category or not, use discrimination. To do so, students must be able to recognise essential traits and attributes of the category and determine if new material has those qualities and so belongs to the group. In terms of online Learning course design, drag-and-drop exercises to categorize concepts into multiple categories might be used as examples of constructing discrimination activities.

2.4.1.2. Generalization

When the learning objectives are such that learners are expected to assign the same characteristics to all objects within a category after recognizing the attributes of an item belonging to that category, generalization is appropriate. Teaching via examples is based on an inductive technique to providing online learning information, in which learners should be able to discover their common characteristic(s) and generalize by constructing the rule after witnessing a series of independent online instances. Generalization, from this perspective, is quite similar to what we now call active learning, with an obvious link to constructivism.

2.4.1.3. Association

In strictly behavioural words, however, association is a typical example of conditioning – linked to a particular stimulus – in current online learning, a tendency exists to create association-based online learning interactions when new information is presented in connection with specific practical applications of the learning objective. Presenting material in context can assist learners in making associations. This implies that anytime learners come across the same or comparable material, they already know what it is linked to since they have established a fundamental frame of reference with which to associate this piece of knowledge. Although a behavioristic approach sees this association as an automated drill activity rather than a cognitive process used in Instructional Design for online learning, matching exercises are examples of online learning activities that may be structured to help learners make associations.

2.4.1.4. Chaining

Chaining is the automated execution of learners on particular operations with preset stages to follow. One step leads to the next, much like a chain. Drill activities are an example of an online learning target that may be accomplished via chaining. Drill activities in eLearning are created by first providing the theoretical model and then requesting learners to replicate the method by actually performing the procedures

required in the same sequence they were provided. Learners are able to achieve the intended goal by following the stages exactly as provided in the model through repetition and online practise. Drag and Drop sequence ordering activities are quite commonly utilized in the quiz templates offered by most of the online learning writers. These activities might serve as typical examples of the work done in the creation of online courses. There is always a predetermined and unique right sequence of tasks for which students have to form to prove that they have mastered the learning goal. Another behavioural method which is highly relevant in eLearning, based upon a number of attempts the instructional designer permits, is quite frequent for trainees to attain the intended goal via tests and errors.

2.4.2. Behaviorism and Online Learning

The learner's conduct in the learning process is judged by the behaviourism learning theory. For improved learning behaviour, the behaviourism learning theory permits a student to closely follow the directions supplied by the instructors. In this study, the students used the behaviourism learning theory to complete the online lessons on their own time. The instructors also assessed the participants' conduct in order to guarantee that the online learning was of high quality. The students' participation in the lectures was judged using an online attendance system and quizzes during the lectures.

2.5. Research Hypothesis

Ho (Null Hypothesis): No significant difference has been found between the academic achievements of students in online and face to face modes of learning.

H1 (Alternative Hypothesis): There is a significant difference between the academic achievements of students learned by face to face and online modes of learning.

3. Methodology

A research was conducted for statistical comparison of academic achievements of postgraduate students learned by online learning and face-to-face modes of learning. The research was done on the postgraduate students studying in the Education degree. In 1st semester the students learned Educational Technology course by online mode of learning while in the 2th semester, the students learned the Teaching Strategies course by Face-to-face learning. The number of students in each semester was 40. The University LMS account was used for online learning. This study comprises of two semesters (32 weeks). The learning process by Face-to-Face and online modes of learning used by the students is shown in Figure 3.

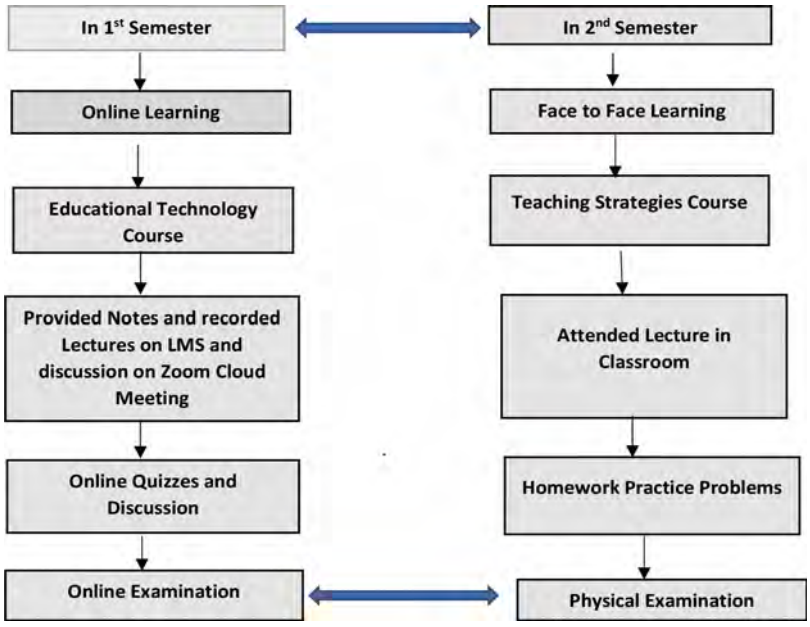

Figure 3. Online and Face to Face Learning Strategies Used in this Study

3.1. Participants

The population of study was the postgraduate students of the Department of Education, Ghazi University, Dera Ghazi Khan, Punjab, Pakistan. The total population was 160 students consisting of 4 different sections. A sample of 40 postgraduate students of one section was randomly selected for the current study. The random sampling technique was used to select the sample size.

3.2. Data Collection

The data of learners of 1st and 2nd semesters were collected from the Department of Education, Ghazi University, Dera Ghazi Khan, Punjab Pakistan. The final semester term examinations was used to collect the data. The data was consisted on the academic results of 1st and 2nd semesters of the students who were studying in a postgraduate class of Education degree followed by online learning mode in 1st semester and face-to-face learning mode in 2nd semester. The data was then analyzed statistically by using SPSS-20. The reliability of the instrument is determined by Internal Consistency Reliability method. The validity is done by ensuring that each students have enough knowledge about how to operate the computer laptops or smart phones to take the online classes and by attendance system.

3.3. Statistical Analysis

The collected academic achievement results of 1st and 2nd semester results were analyzed by using descriptive statistics and t-test analysis. The t-test analysis was performed at a significance level of 0.05.

4. Results

The research methodology followed by the postgraduate Education degree students in online and face to face modes of learning is shown in Figure 3. The students got online learning in the 1st semester of their postgraduate degree in educational technology course and in 2nd semester they followed the face-to-face modes of learning in teaching strategies course. The academic achievements in 1st and 2nd semesters of postgraduate students in Education degree followed by online learning and face to face learning modes were then analyzed statistically. The results of descriptive statistics for online and face to face modes of learning are illustrated in Table 1. The academic achievements of postgraduate students in Education degree learned by online and face to face modes of learning have a mean value from 2.21 to 3.77. The difference (df) of academic achievements of online and face to face modes of learning was from -1.63 to 0.89. The standard error of estimation was also calculated between the academic achievements of students learned by online and face to face modes of learning. The standard error (SE) was ranged from 0.02 to 0.815. The more the difference between the academic achievements of 1st and 2nd semesters, more was the standard error and vice versa. The standard deviation (SD) was ranged from 0.007 to 1.152 for the academic achievements of students in 1st and 2nd semesters. It showed that when the differences between the academic achievements of both semesters students were less, then standard deviation is also less and vice versa.

Sr. No	1st Semester	2nd Semester	Mean	df	SE	SD
1	3.2	3.99	3.595	0.79	0.395	0.558
2	2.90	3.12	3.01	0.22	0.11	0.155
3	3.47	3.41	3.44	-0.06	0.03	0.0424
4	3.10	3.59	3.345	0.49	0.245	0.346
5	3.56	2.92	3.24	-0.64	0.32	0.452
6	3.61	2.97	3.29	-0.64	0.32	0.452
7	4.00	2.37	3.185	-1.63	0.815	1.152
8	2.99	2.67	2.83	-0.32	0.16	0.226
9	3.27	3.81	3.54	0.54	0.27	0.381
10	3.54	3.59	3.565	0.05	0.025	0.0353

Sr. No	1st Semester	2nd Semester	Mean	df	SE	SD
11	3.71	3.78	3.745	0.07	0.035	0.0494
12	3.11	4.00	3.555	0.89	0.445	0.629
13	3.41	3.45	3.43	0.04	0.02	0.0282
14	3.81	3.57	3.69	-0.24	0.12	0.169
15	3.51	3.80	3.655	0.29	0.145	0.205
16	3.04	3.33	3.185	0.29	0.145	0.205
17	3.89	3.44	3.665	-0.45	0.225	0.318
18	3.09	3.29	3.19	0.2	0.1	0.141
19	3.91	3.92	3.915	0.01	0.005	0.007
20	2.90	3.45	3.175	0.55	0.275	0.388
21	2.82	2.89	2.855	0.07	0.035	0.049
22	3.40	3.49	3.445	0.09	0.063	0.045
23	3.44	2.45	2.945	-0.99	0.495	0.700
24	3.55	3.99	3.77	0.44	0.22	0.311
25	3.48	3.79	3.635	0.31	0.155	0.219
26	3.91	3.56	3.735	-0.35	0.175	0.247
27	3.19	3.90	3.545	0.71	0.355	0.502
28	2.94	3.37	3.155	0.43	0.215	0.304
29	2.74	2.20	2.47	-0.54	0.27	0.381
30	3.45	2.34	2.895	-1.11	0.555	0.784
31	3.71	3.01	3.36	-0.7	0.35	0.494
32	2.09	2.33	2.21	0.24	0.12	0.169
33	2.66	2.77	2.715	0.11	0.055	0.077
34	3.03	2.45	2.74	-0.58	0.29	0.410
35	3.33	3.11	3.22	-0.22	0.155	0.11
36	3.41	3.19	3.3	-0.22	0.11	0.155
37	3.30	2.34	2.82	-0.96	0.48	0.678
38	3.18	3.81	3.495	0.63	0.315	0.445
39	3.77	2.89	3.33	-0.88	0.44	0.622
40	3.29	3.99	3.64	0.7	0.35	0.494

Table 1. Descriptive Statistics Results of Students' Academic Achievements in 1st and 2nd Semesters

4.1. T-Test Analysis

The T-test analysis was done for the academic achievements of postgraduate students in Education degree studied in 1st and 2nd semesters followed by online and face to face modes of learning at a significance level of 0.05. The outcomes of t-test analysis of students' academic achievements in 1st semester is shown in Table 2 and for 2nd semester it is shown in Table 3. The difference among the individual's learners in academic achievements of 1st semester varies from -1.23 to 0.68 and for 2nd semester it ranges from -1.06 to 0.74. The square of the individuals difference in academic achievements of students in 1st semester ranges from 0.00 to 0.47 and it ranges from 0.00 to 0.86 for 2nd semester. Similarly, the difference among the individual learner and mean of the total learners in 1st semester varies from -0.68 to 0.58. The mean value for academic achievements in 1st semester (online learning) was 3.32 and it was 3.26 for 2nd semester (face to face learning). The standard deviation (SD) has a value of 0.31 for both semesters. The t-value was 0.549 and p-value was 0.558. As the p-value is more than that of 0.05 ($p>0.05$) so, statistically no significance difference has been found between the academic achievements of postgraduate students of Education degree in 1st and 2nd semester. The null hypothesis (Ho) that there is no significance difference found in the academic achievements of students learned by face to face and online modes of learning proved to be true and rejected the alternative hypothesis (H1) that there is a significant difference of academic achievements of postgraduate students learned by face to face and online modes of learning.

The main reasons for the trueness of null hypothesis and rejection of alternative hypothesis were abruptly shifting of learning modes from face to face to online, slow working of LMS accounts due to over burden, login and voice problems during the online classes. Overall, the students achieved better results in online mode of learning but statistically no significance difference has been found. The statistical results of t-test analysis are shown in Table 4.

1st Semester	Diff (X-M)	Sq. Diff $(X-M)^2$
3.2	-0.12	0.01
2.90	-0.42	0.17
3.47	0.15	0.02
3.10	-0.22	0.05
3.56	0.24	0.06
3.61	0.29	0.09
4.00	0.68	0.47
2.99	-0.33	0.11
3.27	-0.05	0.00
3.54	0.22	0.05
3.71	0.39	0.15
3.11	-0.21	0.04
3.41	0.09	0.01
3.81	0.49	0.24
3.51	0.19	0.04
3.04	-0.28	0.08
3.89	0.57	0.33
3.09	-0.23	0.05
3.91	0.59	0.35
2.90	-0.42	0.17
2.82	-0.50	0.25
3.40	0.08	0.01
3.44	0.12	0.01
3.55	0.23	0.05
3.48	0.16	0.03
3.91	0.59	0.35
3.19	-0.13	0.02
2.94	-0.38	0.14
2.74	-0.58	0.33
3.45	0.13	0.02
3.71	0.39	0.15
2.09	-1.23	1.51
2.66	-0.66	0.43
3.03	-0.29	0.08
3.33	0.01	0.00
3.41	0.09	0.01
3.30	-0.02	0.00
3.18	-0.14	0.02
3.77	0.45	0.20
3.29	-0.03	0.00
	M=3.32	SS=6.11

Table 2. Statistical Analysis for Academic Achievements of 1st Semester (Online Learning)

2nd Semester	Diff (X-M)	Sq. Diff (X-M)
3.99	0.73	0.54
3.12	-0.14	0.02
3.41	0.15	0.02
3.59	0.33	0.11
2.92	-0.34	0.11
2.97	-0.29	0.08
2.37	-0.89	0.79
2.67	-0.59	0.35
3.81	0.55	0.30
3.59	0.33	0.11
3.78	0.52	0.27
4.00	0.74	0.55
3.45	0.19	0.04
3.57	0.31	0.10
3.80	0.54	0.29
3.33	0.07	0.01
3.44	0.18	0.03
3.29	0.03	0.00
3.92	0.66	0.44
3.45	0.19	0.04
2.89	-0.37	0.14
3.49	0.23	0.05
2.45	-0.81	0.65
3.99	0.73	0.54
3.79	0.53	0.28
3.56	0.30	0.09
3.90	0.64	0.41
3.37	0.11	0.01
2.20	-1.06	1.12
2.34	-0.92	0.84
3.01	-0.25	0.06
2.33	-0.93	0.86
2.77	-0.49	0.24
2.45	-0.81	0.65
3.11	-0.15	0.02
3.19	-0.07	0.00
2.34	-0.92	0.84
3.81	0.55	0.30
2.89	-0.37	0.14
3.99	0.73	0.54
	M=3.26	SS=12.00

Table 3. Statistical Analysis for Academic Achievements of 2st Semester (Face to Face Learning)

Modes of Learning	**Mean**	**SD**	**t**	**p**
Online	3.32	0.31	0.549	0.583
Face to Face	3.26			

Not significant at a significance Level of 0.05

Table 4. Statistical Results of T-Test Analysis of Online Versus Face-To-Face Learning Modes

5. Discussion

The online learning has become an efficient and effective practice in higher education as well as in professional training due to its convenience, speed and efficiency in processing information and accessing via web system. In the present age, various information and communication tools are available to improve the efficiency of online learning (Li, 2019; Bahri, Idris, Muis, Arifuddin & Fikri, 2021). Though, there are various difficulties in implementation and processing of online learning, it is very effective learning strategy. The learners don't have to travel daily to the campus to attend the face-to-face classes. The online learning is flexible and can be scheduled according to the time management (Rakerda, Drajati & Ngadiso, 2020).

In the present pandemic conditions of Covid-19, most of the higher educational institutes are closed for maintaining the social distance and to minimize the danger of spreading Covid-19. So, most the higher educational institutions are now functioning by online modes of learning. This shifting from face-to-face learning to online learning has created a lot of burden on the information system of the institutes.

Yates, Starkey, Egerton and Flueggen (2021) conducted a study to evaluate the effectiveness of online learning in Covid-19 conditions. The results of the study indicated that online learning strategy was the best alternating option of face-to-face learning during the pandemic conditions of Covid-19. However, they also indicated some problems related to online learning like students don't want to listen the lecture for a long time, login problems, voice, audio and video problems, network coverage problem for the remote areas and parent's economic problems during Covid-19 when there were no business and markets were off.

By following this pandemic conditions of Covid-19, a statistical comparison of students' academic achievements studying in a postgraduate degree program has been done to evaluate the effectiveness of online versus face-to-face modes of learning. The students followed the behaviorism learning theory during the online classes and their presence in the lectures were ensured by the instructors by the online attendance system and quizzes during the lectures. The results of the study indicated that statistically no significant relation has been found between the academic achievements of the postgraduate students learned by online and face to face learning. The null hypothesis (Ho) proved to be true that there is no significance difference found between the academic achievements of postgraduate students learned by face to face and online modes of learning and rejected the alternative hypothesis (H1). Overall, the students performed well in online learning. The mean value of students' academic achievements was more in online learning modes as compared to the face-to-face modes of learning. Some of the students performed well in face-to-face learning and showed poor performance in online learning. The results of the current study are according to results of the studies done by (Martin & Bolliger, 2018; Wong, Baars, Davis, Van Der Zee, Houben & Paas, 2019; Ajayi & Ajayi, 2020).

5.1. Limitation of Research

This research study has been done on the students' academic achievements learned by online versus face-to-face modes of learning in a single university. These results may not applicable to other universities.

5.2. Challenges in Online Learning during COVID-19 and their Possible Solutions

Online learning and teaching is the subject of numerous meetings between learners, teachers and content issues. It is a difficulty for organizations to attract and connect students in the training course. Educators must change their approach to education and the administration of their time from offline to online. This is a difficulty. In addition to the curriculum, the development of materials including students is difficult (Kebritchi et al., 2017). The quality of online-learning curricula is a significant issue. In terms of online learning programs, the state has no defined settings in its instructional techniques. Quality concepts, online resource creation, online learning material distribution, and quality control are all lacking. This issue must be solved immediately so that everyone may benefit from high-quality online learning (Cojocariu, Lazar, Nedeff & Lazar, 2014). The focus should not only be on specialists who use online learning in catastrophes, but also on enhancing and developing the supremacy of computer-generated courses given in such situations (Affouneh, Salha & Khlaif, 2020).

It may take a great deal of time and expense to study online. It is not straightforward, requiring substantial expenditure in tools and equipment acquisition, appliances management, human resources training and online content development. Therefore, an efficient and efficient education system has to be developed to deliver education via online method. In this vital moment, it is important to ensure digital equity. Not everyone has access to digital devices, wireless internet and Wi-Fi. The availability of adequate digital modes, internet access and Effie Wi-Fi connectivity may be quite difficult, which can influence a lot of students who lack learning opportunities. Management must fight to assure that every student and faculty member uses the resources needed. Students should ensure that all smart phone apps operate if they have no computer. As a result, measures must be done to reduce the digital divide. Learners and instructors at a number of colleges and universities have not been adequately prepared for online learning. The majority of them are satisfied with traditional learning and teaching techniques. The possibility of making the best of the current circumstances due to the spread of the Corona virus. There are several technologies available to aid in the teaching-learning process. Educators must choose the best instrument for delivering instruction to their students. Educational institutions must provide a step-by-step guide to help instructors and students access and use a variety of online learning tools, therefore reducing digital illiteracy by addressing essential course subjects with these technologies. Teachers can utilise video, audio, and lessons to offer lessons in a number of ways. It is advantageous for professors to receive immediate feedback on their lectures via video lectures, computer-generated meetings, and other means, as well as to retain a personal contact with their students (Gillett-Swan, 2017).

6. Conclusion

Due to advancement in technological tools, the online learning process has become easier and more applicable. Now most of the higher educational institutions are shifting their modes of learning from face-to-face mode to online mode. During the current pandemic disease of Covid-19, the online learning modes has been increased vastly. The results of current research study following statistical analysis indicated that most of the students performed well in online learning. Also, there are many students that performed well in face-to-face learning. The null hypothesis (Ho) that there is no significance difference in academic achievements of postgraduate students learned by face to face and online modes proved to be true and rejected the alternative hypothesis (H1). In future, more research can be done on the online modes of learning to generalize the results achieved by the students in online learning under regional context.

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