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New Horizon of ICT for dissemination of knowledge and education on an e- learning and ODL platform with reference to Professional Program in India amid COVID-19

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Abstract

Closures of educational institutions due to COVID-19 pandemic impacted more than 94% of the world's student population and India was no exception to it. Repeated opening and closing of educational institutions in India led the teaching fraternity to apply a mix of online and offline teaching methods leaving differential impacts on performance of students. Hence present study aimed to study the effect of method of teaching, type of subject and gender and their various interactions on performance of students by using a three ways ANNOVA to check their main effects and first & second order interaction effects. The study pointed out that offline method of teaching performed much better for teaching numerical subjects to female students whereas there is just a slight effect of change in method of teaching from online to offline on the performance of female students in case of theoritical subjects. As a result, in the aftermath of the University Grants Commission's introduction of the New Education Policy and the concept of Blended Learning, it is proposed that when using any teaching technique, the needs of the particular subject to be considered.

Keywords: *COVID-19, Online Teaching, Offline Teaching, New education policy, Blended Learning, University Grants Commission.*

1. Introduction

The Corona Virus Disease-2019 (COVID-19) pandemic, a global health crisis, was reported in Wuhan, China, in December 2019 [Wang et al. 2020]. Subsequently COVID-19 has been reported in 213 nations and territories, including India, according to a World Health Organization report. People become infected through respiratory droplets formed when an infected person coughs, sneezes, or talks to another person within a 6 foot radius [World Health Organization report 2020. The only proper technique to control the COVID-19 is to assure the distance measures among the people through social or physical distancing. To stop the spread of the COVID-19 epidemic, educational institutions around the world have been temporarily closed. Over 91 percent of the world's student population is affected by educational establishment closures [UNESCO Article and Zhu and Liu (2020)]. As the COVID-19 pandemic spreads, there has been an increasing move towards teaching online because of shutting down of schools, colleges and universities for an indefinite time as the only option left [Martinez, 2020]. According to UNESCO, the COVID-19 closures and related instructional modifications have impacted

more than 1.5 billion pupils globally (90.1 percent of total enrolled learners) since the outbreak of the pandemic. [UNESCO]. Due to the abrupt closure of most educational institutions around the world, face-to-face training had to be converted to a totally online (or blended/hybrid) format in a short period of time. As a result, academic institutions that previously relied solely on traditional face-to-face instruction faced a variety of difficulties during the changeover. [Dhawan, (2020)] Although the online education has not been a new concept to educators in general, the COVID-19 pandemic introduced an unprecedented and global need to explore online teaching/learning opportunities within the entire spectrum of educational levels and majors. As a result, now is the moment to seriously rethink, revamp, and revamp our educational system, which is in desperate need of change due to the unprecedented contemporary scenario. Informal and non-formal schooling are also impacted significantly. However, it is a well-known premise that no pedagogical technique can replace the pinnacle position of formal education because of the direct interaction between the teacher and the students. However, in the aftermath of the COVID-19 issue, online education evolved into a pedagogical change from old methods to a modern approach to teaching-learning, moving from the classroom to Zoom, personal to virtual, and seminars to webinars.

Several government efforts have been developed to promote digital literacy in India, including Digital India and Skill India. e-Basta (digital versions of school books), e-Education (all schools connected to broadband and free Wi-Fi), development of pilot MOOCs (Massive Online Open Courses), Nand Ghars (digital tools as teaching aids), SWAYAM (MOOCs based on curriculum taught in classrooms from 9th grade to post-graduation), and India Skills Online are a few more examples (learning portal for skill training).

Clearly, government programmes contribute significantly to the benefits of online education. [Palvia et al. (2018)]. If current trends continue, it appears that it will progressively supplant the official education system to change the destination and direction of the entire education system around the world in postCOVID-19 circumstances.

E-learning has experienced significant change due to the exponential growth of the internet and information technology [Biasutti M. (2017)]. New elearning platforms are being developed for tutors to facilitate assessments and for learners to participate in lectures [Molins-Ruano et al. (2014)]. Both assessment processes and self-evaluation have been proven to benefit from technological advancement. Even courses that solely offer online contents such as Massive Open Online Courses (MOOCs) have also become popular [Rizvi et al.]. The inclusion of e-Learning tools in higher education implies that a greater amount of information can be analyzed, improving teaching quality [Maldonado-Mahauad et al.]. In recent years, many studies have been performed analyzing the advantages and challenges of massive data analysis in higher education [Tsai et al.]. A study of Gasevic et al. indicates that time management tactics had significant correlations with academic performance. The study also demonstrated that assisting students in their management of learning resources is critical for a correct management of their learning strategies in terms of regularity [Jovanovic et al.].

E-learning is linked to a number of arguments. Some of the grounds for online pedagogy include accessibility, cost, flexibility, learning pedagogy, lifelong learning, and policy. It is said that online learning is simple to use and that it can even reach rural and remote locations. In terms of transportation, lodging, and the overall expense of institution-based learning, it is considered to be a significantly less expensive way of education. Another appealing feature of online learning is the ability to arrange or plan one's time for

completing courses offered online. Blended learning and flipped classrooms are created by combining faceto-face lectures with technology; this form of learning environment can help students learn more effectively. Students can learn at any time and from any location, gaining new skills and preparing for a lifetime of learning. The government also recognizes the increasing importance of online learning in this dynamic world.

Teachers and students are in the process of adapting to this new teaching and learning style, as this e-learning wave is a recent development. In the current situation of virtual teaching and the establishment of a new normal of teaching-learning methodology, it is all the more important to learn about learners' opinions and to explore learners' inclination towards this novel teaching methodology, such as their degree of adaptation and, if any, amendments they would like to suggest for the same, or their desire to reject it entirely. [Bali and Liu (2018)]. In the view of above discussion the present study aims at measuring the impact of online and offline teaching methods on the performance of students in different subjects.

2. Review of Literature

Review of literature helps to evaluate existing studies and to find the research gap in relation to the study. Accordingly, **Pokhrel and Chetri (2021)** pointed out that teachers and student learners should be oriented on use of different online education tools. After the pandemic, when normal classes will resume teachers and learners should be encouraged to continue such online tools to enhance teaching and learning. **Muthupradsad et al. (2021)** found a positive attitude towards online classes in the wake of corona. Students preferred well structured content with recorded videos on university website. **Singh and Aggrawal (2021)** found that quality of instructor, course design; prompt feedback and expectations positively impact student performance. **Naik et al. (2021)** argued that traditional chalk and talk methodology is often better than online sessions and lack of facilities, infrastructure, technical tools and internet access are some of the major drawbacks for conducting online classes. **Yadav (2021)** argued that online classes cannot be accessed by each student due to the unavailability of smart phones, laptops and mobile network to especially poor families and remote areas. The students are not aware of the screen effect and get addicted to mobile phones that may cause mental and eye problems. Online teaching cannot take position of traditional classrooms. **Khan et al. (2021)** found a preference for online learning among the students as it provides them much freedom to connect with their teachers, fellow students and engage with their study materials at their comfort and flexibility of time. **Coman et al. (2020)** found that higher educational institutions in Romania were not prepared for online learning because of technical issue, lack of technical skills, lack of student teacher interaction or poor communication with them during online teaching learning in the context of the crisis caused by the pandemic. **Gopal, Dhawan (2020)** suggested that infrastructure needs to be so strong so that it can provide unhindered services during and after the COVIID crisis. There is a dire need to weigh the pros and cons of technology and to harness its potentials. **Chakarborty et al. (2020)** pointed out that student felt that online education is stressful and affecting their health and social life. Students learn better in physical classrooms. They appreciated the software's and online study materials being used to support their online studies. **Radha et al. (2020)** found a general positive attitude among students about e learning and there has also been found a great interest and increased use of the e-learning programmes for academic uses. **Jena (2020)** found that the concept of "Work from home" got greater relevance in such pandemic situation. Online practices are benefitting the students immensely and it should be continued even after the lockdown. **Koul and Bapat (2020)**

pointed out that internet connectivity and continuous supply of electricity are the key challenges being experienced by the students in the pandemic period with regard to their online learning. **Hong et al. (2020)** argued that online teaching is an extension of offline classroom teaching but is impossible to replace traditional classrooms. **Salamat et al. (2018)** agreed that e learning provides time flexibility to the students and motivates students to do their own work without other help. Students feel comfort in browsing and surfing internet. **Palvia et al. (2018)** presented that online education in its various modes has been growing steadily worldwide due to the confluence of new technologies, global adoption of internet and intensifying demand for a workforce trained periodically for the ever evolving digital economy. **Sun and Chen (2016)** found that online education has developed rapidly and fuelled by internet connectivity, advanced technology and massive market. **Nguyen (2015)** found that online learning is at least as effective as the traditional learning but the evidence is conclusive by no means.

3. Statement of problem

Repeated opening and closing of educational institutions during the COVID-19 pandemic in India led the teaching fraternity to apply a mix of online and offline teaching methods. In this study an attempt has been made to study the effect of method of teaching, type of subject and gender and their various interactions on performance of students. Hence the study has been titled as "**Impact of online and offline teaching on student performance during COVID-19 pandemic: A case study".**

4. Objective of the study

To study the effect of method of teaching, gender and type of subject and their various interactions on performance students.

5. Research Hypothesis

There is no significant effect of method of teaching, type of subject and gender and their various interactions on performance of B.Com students of GDC Arki.

6. Research Methodology

The present study is an experimental and exploratory in nature. Target population for this study included 59 students of B.com final year of Government Degree College Arki, District Solan, H.P. In order to reach at conclusions the study followed a multi-stage approach. First of all a random sample of 40 students was selected and out of these, two independent groups of twenty students each consisting ten male and ten female students were framed. Then both the groups were taught two different subjects one being a numerical subject and other a theoretical subject using two different approaches of teaching i.e. online live interactive classes using Google meet/Zoom app and offline mode through classroom teaching for a total of 15 hours. Finally their performance was measured through a class test of fifty marks.

Table 1: Sample Profile

Method of Teaching	**Online Teaching**				**Offline Teaching**			
Frequency	20				20			
Gender	**Male**		**Female**		**Male**		**Female**	
Frequency	10		10		10		10	
Type of Subject	**Numerical Subject**	**Theoretical Subject**	**Numerical Subject**	**Theoretical Subject**	**Numerical Subject**	**Theoretical Subject**	**Numerical Subject**	**Theoretical Subject**
Frequency	5	5	5	5	5	5	5	5

Source: Data compiled through case study

7. Tools and techniques for analysis:

The present study consists of three independent variables i.e. method of teaching (online and offline), gender (male and female), type of subject (numerical and theoretical) and one dependent variable i.e. student performance measured by obtained score in fifty marks test. So keeping in view the objectives of the study following

techniques and tools have been applied for data analysis:

7.1 Descriptive tools

Mean is used to check the mean score in the test and standard deviation is used to measure and compare the variation in different groups.

7.2 Inferential tools

In order to check the significance of differences in the performance of students as per different methods of teaching, gender and type of subject, three ways ANNOVA has been applied to measure their main effects and first & second order interaction effects.

8. Results and discussion

To reach at results, findings and conclusions following observations were identified, analyzed and interpreted:

8.1 Checking of homogeneity of variances: Levene's test of equality of error variances has been conducted to check the homogeneity of variances. Table 2 discloses (F=1.484, df1=7, df2=32, p=0.208>0.05) the p value to be significant at 0.05 level of significance which lead to conclude that the condition of homogeneity of variances hold good to apply a three ways ANNOVA. The sample design has been presented in below table 1.

Table 2: Test of homogeneity of variances

Levene's Test of Equality of Error Variances[a]			
Dependent Variable: Score in Test			
F	**df1**	**df2**	**Sig.**
1.484	7	32	**0.208**
a. Design: Intercept + Method of teaching + type of subject + gender + Method of teaching * type of subject + Method of teaching * gender + type of subject * gender + Method of teaching * type of subject * gender			

Source: Data compiled through case study.

8.2 Descriptive statistics

Table 3 reports the descriptive results of analysis. As shown in the table, in case of online teaching mean score of female students in the numerical subject (32.80) was higher than that of the male students (29.60), whereas the mean score of male students in theoretical subject (41.80) was greater than that of the female students (41.40). Overall mean score of female students in online teaching (39.25) was found slightly greater than that of male students (39.15). On the other hand in case of offline teaching, mean score of male students in both numerical and theoretical subjects were 45.00 and 40.20 respectively which was higher than those of the female students (43.40, 39.40). The mean score of numerical subject in online teaching was greater than that of theoretical subject while teaching with offline modes. Overall mean score of male students in online teaching (35.70) was found lesser than that of female students (37.10). Finally the mean score of female students (39.25) was found higher than the male students (39.15) irrespective of method of teaching and type of subject.

Table 3: Descriptive Statistics

Dependent Variable: Score in Test					
Method of teaching	**Gender**	**Type of subject**	**Mean**	**Std. Deviation**	**N**
Online teaching	**Male**	**Numerical Subject**	29.60	2.40	5
		Theoretical Subject	41.80	1.78	5
		Total	35.70	6.73	10

	Female	Numerical Subject	32.80	3.03	5
		Theoretical Subject	41.40	2.60	5
		Total	37.10	5.25	10
Offline Teaching	Male	Numerical Subject	45.00	1.58	5
		Theoretical Subject	40.20	1.92	5
		Total	42.60	3.02	10
	Female	Numerical Subject	43.40	3.64	5
		Theoretical Subject	39.40	1.14	5
		Total	41.40	3.30	10
Total	Male	Numerical Subject	37.30	8.34	10
		Theoretical Subject	41.00	1.94	10
		Total	39.15	6.19	20
	Female	Numerical Subject	38.10	6.41	10
		Theoretical Subject	40.40	2.17	10
		Total	39.25	4.81	20
	Total	Numerical Subject	37.7000	7.25	20
		Theoretical Subject	40.7000	2.02	20
		Total	39.2000	5.47	40

Source: Data compiled through case study.

8.3 Results of three ways ANNOVA

Table 4 presents the results of three ways ANNOVA to check effect of method of teaching, type of subject and gender and their various interactions on student performance.

8.3.1 Main Effects:

The main effects include effect of method of teaching, effect of gender and effect of type of subject on the student performance in test. All the main effects have been presented below separately:

Method of teaching: An observation of table 3 reveals that the mean score in test by the students taught through offline method (41.40) is higher than the offline method (37.10). This means that offline teaching is found to be superior to online teaching in terms of student's performance in test. Table 4 reports that the effect of method of teaching on student performance is significant at 0.01 level of significance ($F=54.777$, $df=1$, $p=0.000<0.01$). Thus the null hypothesis that "there is no significant effect of method of teaching on the performance of students" is rejected, which further leads to conclude that online and offline methods of teaching have different effects on student's performance. The effect size, partial eta squared is 0.631 (Table 4), meaning that 63.1 percent of the variance in the performance of students accounts for method of teaching.

***Gender of students*:** Table 3 further reveals that the mean score in test of female students (39.25) was just slightly higher than the mean score of the male students (39.15). This means that student's performance in test has a very slight difference in terms of their gender. It is also evident from the table 4 that the effect gender on student performance is not significant at 0.05 level of significance ($F=0.17$, $df=1$, $p=0.896<0.05$). Thus the null

hypothesis that "there is no significant effect of gender on the performance of students" is accepted which further leads to conclude that student's performance does not differ significantly as per the gender of students. The effect size, partial eta squared is 0.001 (Table 4), meaning that 0.1 percent of the variance in the performance of students accounts for gender of the students.

Table 4: Effect of method of teaching, gender and type of subject and their various interactions on student performance

Tests of Between-Subjects Effects						
Dependent Variable: Score in Test						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial eta squared**
Corrected Model	985.200[a]	7	140.743	24.584	0.000	0.843
Intercept	61465.600	1	61465.600	10736.349	0.000	0.997
Method of teaching	313.600	1	313.600	54.777	**0.000**	**0.631**
gender	.100	1	.100	.017	**0.896**	**0.001**
Type of subject	90.000	1	90.000	15.721	**0.000**	**0.329**
Method of teaching * gender	16.900	1	16.900	2.952	**0.095**	**0.084**
Method of teaching * type of subject	547.600	1	547.600	95.651	**0.000**	**0.749**
gender * type of subject	4.900	1	4.900	.856	**0.362**	**0.026**
Method of teaching * gender * type of subject	12.100	1	12.100	2.114	**0.156**	**0.062**
Error	183.200	32	5.725			
Total	62634.000	40				
Corrected Total	1168.400	39				
a. **R Squared = .843 (Adjusted R Squared = .809)**						

Source: Data compiled through case study.

***Type of subject*:** It is clear from the table 3 that mean score in test in the theoretical subject (40.70) was higher than the mean score of numerical subject (37.70). This means that students performed better in the theoretical subject as compared to the numerical subject. The table 4 further shows that the effect of type of subject taught on student performance is significant at 0.01 level of significance ($F=15.721$, $df=1$, $p=0.000<0.01$). Thus the null hypothesis that "there is no significant effect of type of subject on the performance of students" is rejected, which further leads to conclude the performance of students differs significantly in numerical and theoretical subjects. The effect size, partial eta squared is 0.329 (Table 4), meaning that 32.9 percent of the variance in the performance of students accounts for type of subjects.

An overall comparison of direct effect size leads to conclude that variation in the performance of students had highest effect of method of teaching followed by the effect of type of subject and then a very marginal effect of gender of students.

8.3.2 First order interaction effects

The first order interaction effects include interaction effect of method of teaching and gender, interaction effect of method of teaching and type of subject and interaction effect of gender and type of subject on the student performance in test. All these effects have been presented separately as following:

***Method of teaching and gender*:** It is clear from table 3 that mean score of female students taught with online methods (37.10) was higher than mean score of the male students (35.70), on the other hand the mean score of male students taught with offline methods (42.60) was higher than mean score of the female students (41.40). This means the male students performed better with offline teaching as compared to female students who performed better with online teaching. It can be observed from the table 4 that the interaction effect of method of teaching and gender of the students is not significant at 0.05 level of significance ($F=2.952$, $df=1$, $p=0.000<0.01$). Thus the null hypothesis that "there is no significant interaction effect of method of teaching and gender of students on the performance of students" is accepted, which further leads to conclude that student's performance is does not differ significantly as per methods of teaching and their interactions with gender of the students. Method of teaching and gender of the students jointly has no impact on performance of students. The effect size, partial eta squared is 0.084 (Table 4), meaning that 8.4 percent of the variance in the performance of students accounts for interaction effect of method of teaching and gender of the students.

***Method of teaching and type of subject*:** Table 3 shows that mean score of students who were taught numerical subject with offline methods (44.20) was higher than mean score of students taught with online methods in the same subject (31.20), whereas mean score of students who were taught theoretical subject with online methods in (41.60) was higher than mean score of students taught with offline methods in the same subject (39.80). This means that online methods worked better to teach theoretical subjects whereas offline teaching proved better in teaching of numerical subjects. It can also be observed from the table 4 that the interaction effect of method of teaching and type of subject is significant at 0.01 level of significance ($F=95.651$, $df=1$, $p=0.000<0.01$). Thus the null hypothesis that "there is no significant interaction effect of method of teaching and type of subject on the performance of students" is rejected, which further leads to conclude that performance of students in numerical and theoretical subjects differ significantly as per online and offline methods of teaching. The effect size, partial eta squared is 0.749 (Table 4), meaning that 74.9 percent of the variance in the performance of students accounts for interaction effect of method of teaching and type of subject.

***Gender and type of subject*:** It is shown in the table 3 that mean score of female students in numerical subject (38.10) was higher than mean score of male students (37.30), and on the other hand mean score of male students in theoretical subject (41.00) was slightly higher than mean score of female students (40.40). Hence it can be concluded that male students performed little better in theoretical subjects and female students in numerical subject. It can also be observed from the table 4 that the interaction effect of gender and type of subject is not significant at 0.05 level of significance ($F=0.856$, $df=1$, $p=0.362<0.01$). Thus the null hypothesis that "there is no significant

interaction effect of gender and type of subject on the performance of students" is accepted, which further leads to conclude that performance of male and female students does not differ significantly as per numerical and theoretical subjects. The effect size, partial eta squared is 0.026 (Table 4), meaning that 2.6 percent of the variance in the performance of students accounts for interaction effect gender and type of subject.

An overall comparison of interaction effect size (first order interactions) leads to conclude that variation in the performance of students had highest effect of interaction of method of teaching and type of subject followed by the interaction effect of method of teaching and gender and then a very marginal interaction effect of gender and type of subject.

8.3.3 Second order interaction effects

Method of teaching, gender and type of subject: Table 4 shows that the interaction effect of method of teaching, gender and type of subject is not significant at 0.05 level of significance ($F=2.114$, $df=1$, $p=0.156<0.01$). Thus the null hypothesis that "there is no significant interaction effect of method of teaching, gender and type of subject on the performance of students" is accepted, which further leads to conclude that performance of male and female students does not differ significantly as per numerical and theoretical subjects taught with online and offline methods of teaching. The effect size, partial eta squared is 0.062 (Table 4), meaning that only 6.2 percent of the variance in the performance of students accounts for interaction effect gender and type of subject.

8.3.4 Interaction effect of method of teaching and type of subject on male students:

Table 5 shows that the interaction effect of method of teaching and type of subject on male students is significant at 0.05 level of significance ($F=95.066$, $df=1$, $p=0.000<0.01$). Thus the null hypothesis that "there is no significant interaction effect of method of teaching and type of subject on the performance of male students" is rejected, which further leads to conclude that performance of male students differ significantly as per numerical and theoretical subjects taught with online and offline methods of teaching. The effect size, partial eta squared is 0.856 (Table 5), meaning that 85.6 percent of the variance in the performance of male students accounts for interaction effect of method of teaching and type of subject. The performance of male students has higher effect size of 79.7 percent due to different methods of teaching, followed by a 53.0 percent effect size due to difference of type of subject.

Table 5: Interaction effect of method of teaching and type of subject on male students

Tests of Between-Subjects Effects[a]						
Dependent Variable: Score in Test						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial eta squared**
Corrected Model	667.750[b]	3	222.583	58.575	**.000**	**0.917**
Intercept	30654.450	1	30654.450	8066.961	**.000**	**0.998**
Method of teaching	238.050	1	238.050	62.645	**.000**	**0.797**
Type of subject	68.450	1	68.450	18.013	**.001**	**0.530**

Method of teaching * Type of subject	361.250	1	361.250	95.066	**.000**	**0.856**
Error	60.800	16	3.800			
Total	31383.000	20				
Corrected Total	728.550	19				
a. gender = Male						
b. R Squared = .917 (Adjusted R Squared = .901)						

Source: Data compiled through case study.

The interaction effect effect of method of teaching and type of subject on performance of male students has also been presened in below figure 1. As evident from the figure, mean socre of male students is rising as we shift from online to offline teaching for numerical subjects whereas there is a slight decline in mean score of theoretical subjects as we shift from online to offline method of teaching to male students.

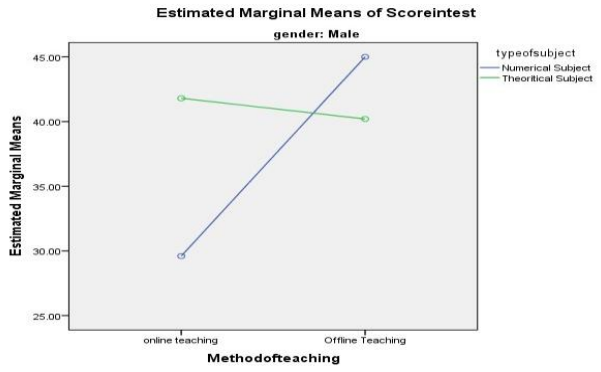

Figure 1: Interaction effect of method of teaching and type of subject on male students

Hence the above figure conclude that offline method of teaching performed better for teaching numerical subjects whereas there is just a slight effect of change in method of teaching from online to offline on the performance of male students in case of theoritical subjects.

8.3.5 Interaction effect of method of teaching and type of subject on female students:

Table 6 shows that the interaction effect of method of teaching and type of subject on female students is significant at 0.05 level of significance (F=25.941, df=1, p=0.000<0.01). Thus the null hypothesis that "there is no significant interaction effect of method of teaching and type of subject on the performance of female students" is rejected, which further leads to conclude that performance of female students differ significantly as per numerical and theoretical subjects taught with online and offline methods of teaching. The effect size, partial eta squared is 0.619 (Table 5), meaning that 61.9 percent of the variance in the performance of female students accounts for interaction effect of method of teaching and type of subject. The performance of female students has higher effect size of 43.0 percent due to different methods of teaching, followed by a 17.8 percent effect size due to difference of type of subject.

Table 6: Interaction effect of method of teaching and type of subject on female students

Tests of Between-Subjects Effects[a]						
Dependent Variable: Score in Test						
Source	**Type III Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**	**Partial eta squared**

Corrected Model	317.350[b]	3	105.783	13.828	**.000**	**0.722**
Intercept	30811.250	1	30811.250	4027.614	**.000**	**0.996**
Method of teaching	92.450	1	92.450	12.085	**.003**	**0.430**
Type of subject	26.450	1	26.450	3.458	**.081**	**0.178**
Method of teaching * type of subject	198.450	1	198.450	25.941	**.000**	**0.619**
Error	122.400	16	7.650			
Total	31251.000	20				
Corrected Total	439.750	19				
a. gender = Female						
b. R Squared = .722 (Adjusted R Squared = .669)						

Source: Data compiled through case study.

The interaction effect effect of method of teaching and type of subject on performance of female students has also been presened in below figure 2. As evident from the figure, mean socre of female students is rising (faster than male students) as we shift from online to offline teaching for numerical subjects whereas there is a decline (sharper than male students) in mean score of theoretical subjects as we shift from online to offline method of teaching.

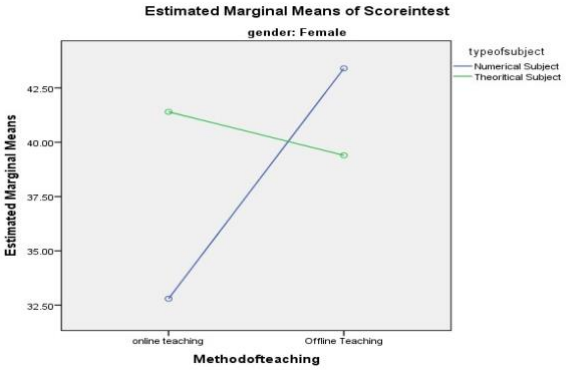

Figure 2: Interaction effect of method of teaching and type of subject on female students

It leads to conclude that offline method of teaching performed much better for teaching numerical subjects to female students (greater than that of male students) whereas there is just a slight effect of change in method of teaching (but sharper than that of male students) from online to offline on the performance of female students in case of theoritical subjects

9. Findings

The primary purpose of this study was to study the effect of method of teaching, gender and type of subject and their various interactions on performance students. The study found that online teaching is more effective for teaching numerical subjects for female students whereas offline teaching is more effective for teaching theoretical subjects for female students. There is a very slight difference in overall performance of male and female students if taught by online methods whereas male students performed better in both subjects if taught by offline methods. But female students performed better than male students irrespective of method of teaching and type of subject. Methods of teaching and type of subject have different significant effects on student's performance whereas student's performance does not differ significantly as per the gender of students. A comparison of effect size shows highest effect of interaction of method of teaching and type of subject followed by the interaction effect of method of teaching and gender and then a very marginal interaction effect of gender and type

of subject. It has also been found that performance of male and female students does not differ significantly as per numerical and theoretical subjects taught with online and offline methods of teaching. To conclude it has been observed that offline method of teaching performed much better for teaching numerical subjects to female students (but greater than that of male students) whereas there is just a slight effect of change in method of teaching (but sharper than that of male students) from online to offline on the performance of female students in case of theoritical subjects

10. Conclusion

It will be too early to determine how students and teachers will cope with online learning when they figure out the restrictions and reorient to handle them. The contours of the education system are altering in response to efforts to prevent the spread of the new Corona virus, with online education becoming the dominant mode of instruction. To make an online course more useful and productive for the learner, the above criteria should be taken into account when constructing it. It's probable that, once the COVID-19 pandemic has passed, we'll see a continuous rise in educational systems adopting online platforms in a hybrid format alongside normal classrooms. As a result, this research will be valuable in envisioning and rebuilding higher education with online components.

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