Economics World, Oct.-Dec. 2021, Vol. 9, No. 4, 173-177
doi: 10.17265/2328-7144/2021.04.004

Comparison of Students Academic Performance in Mathematics Between Online and Offline Learning

Serkan Kaymak, Aliyeva Kalamkas
Suleyman Demirel University, Kaskelen, Kazakhstan

The coronavirus has affected many areas of life, especially in the field of education. With the beginning of the Pandemic, the transition to online learning began, which affected the development of students and teachers in terms of using innovative technologies and programs, such as Zoom, Webex, Discord, Google Meet, Moodle, EDX, Coursera, www.examus.network, etc. In this regard, many teachers are wondering whether the online method of teaching is as effective as the offline method. In this article, we focused on finding out whether there is a significant difference in student performance between online and offline modes of learning in the study of mathematics. 58 students were in a group where they studied online and 58 students were in a group where they studied offline. The study involved first-year college students of Jambyl Innovative Higher College (JICH) in Taraz, Kazakhstan. The final control work was carried out at the end of week 18, which tested all areas covered by the topic in both groups. The average scores of students studying offline were compared with the average of students studying online. To avoid confusion, the researchers also conducted and analyzed an independent t-test. The results showed that there is a significant difference in the academic performance of students who study online and offline. The offline teaching method has proven to be more effective for improving students' understanding and comprehension of mathematics topics.

Keywords: online learning, offline learning, achievement in mathematics

Introduction

This study was aimed to find out which type of training is best suited for college freshmen to learn mathematics by comparing online learning and offline learning. 58 students were in a group where they studied online and 58 students were in a group where they studied offline. The study involved first-year college students of Jambyl Innovative Higher College (JICH) in Taraz, Kazakhstan. The online training lasted 17 weeks. The offline training was 17 weeks. The final control work was carried out in the 18th week in both groups for. The average scores of students studying offline were compared with the average of students studying online, and an independent t-test was also conducted and analyzed. The results showed that there is a significant difference in students' academic performance when they study mathematics offline and online.

Serkan Kaymak, Ph.D. student and lecturer, Department of Educational Sciences, Suleyman Demirel University, Kaskelen, Kazakhstan.
Aliyeva Kalamkas, M.Sc. student, Department of Natural Science and Mathematics Education, Suleyman Demirel University, Kaskelen, Kazakhstan.
Correspondence concerning this article should be addressed to S. Kaymak, Suleyman Demirel University, Almaty region, Karasay area 040900, Kaskelen, Abylai khan street, 1/1, Kazakhstan.

Offline methods of study have proven to be effective in improving students' assimilation and understanding of topics.

Literature Review

Offline learning format is a lecture-based learning method in which students are taught in classrooms by teachers of an educational institution. Time management, student motivation, technical problems, and limited Internet access are among the main factors, one of the factors that makes offline learning still a most popular way of learning (Pei & Wu, 2019). But still, students living in remote places are forced to move closer to the educational institution to student houses or dormitories. In this regard and with the Pandemic, various researchers are proposing new innovative methods and ways of teaching in the classroom to promote active learning and the introduction of multimedia and technology in classroom teaching (Dhawan, 2020).

As a result of the integration of technologies and the use of the Internet more actively than before, online learning is gaining popularity all over the world according to Palvia et al. (2018). As mentioned by Dhawan (2020), online learning is an instrument to make education more student-centered than teacher-centered. Online training can be conducted in a synchronous environment using various devices (for example, mobile phones, laptops, etc.) with Internet access. As Singh and Thurman (2019) mentioned, students can be anywhere (independently) to study.

Synchronous learning environment is a learning environment where students attend live lectures, there is real-time interaction between teachers and students, and there is the possibility of instant feedback. It is also known that synchronous learning can provide an opportunity for social interaction (McBrien, Cheng, & Jones, 2009).

Kaymak et al. (2021) in their study on 62 7th Grade students for five weeks investigated the effect of online education and offline education on students' success in mathematics course. The results showed that there is not a significant difference in students' achievement when they take offline or when they take online studies. Both methods were found to be equally effective in enhancing student understanding and comprehension of the topics.

During the COVID-19 Pandemic, online platforms provide such opportunities as:

- to make video conferences without the need to be in the same office,
- lectures are available on any device,
- it is possible to view already recorded lectures,
- instant feedback from the teacher or from classmates,
- to make it possible to gain knowledge in any place where there is an Internet connection,
- to give you the opportunity to save time on the road we spent.

Purpose of the Study

The aim of the study was to compare the differences in the academic performance of first-year students of the Jambyl Innovative Higher College (JICH) in Taraz, Kazakhstan, between online and offline methods.

Research Question

Is there a significant difference in the academic performance, in learning mathematics, in college freshmen who study using the online learning method and the offline learning method?

Methodology

In this study 58 students were in a group where they studied online and 58 students were in a group where they studied offline. The group that studied offline attended a class in the college building, while for the group that studied online, the classes were in the online platform Discord and EduPage. The study was conducted for 18 weeks. The first group used full offline learning, while the second group conducted all their classes in an online format. The study was conducted at Jambyl Innovative Higher College (JICH) in Taraz, Kazakhstan, and the lessons were conducted by one teacher according to the same plan, that is, she covered the same topics.

Instrument

Final control work: Students' academic achievements were measured using the final control work (Midterm exam), which was prepared by researchers and teachers. The final control work was comprehensive and measured students' understanding and application of the entire topic, which was taught to students during the entire 17-week period. Teachers minimized fraud both in the online group and in the offline group by checking the methods of solving each problem. The control work consisted of seven mathematical problems.

Data Collection and Analysis

58 students were in a group where they studied online and 58 students were in a group where they studied offline. The students were taught for a period of 17 weeks with four periods of mathematics lesson in a week each lasting 35 minutes.

Procedure

Students were taught by one teacher. Students in an autonomous format attended classes, as usual, from college, and the teacher taught them in two classes, since during the Pandemic there was a limit in the number of students who should be in one office. And in online classes, students studied using the Discord app and learned information about their grades and homework in EduPage offers. In the online training format, the whole group studied in one virtual class. The teacher tried to ensure that both groups covered topics at the same pace, and conducted the same projects and quizzes to expand the coverage of similar topics. At the end, the researchers and the teacher prepared a final test paper that covered the entire topic and tested the students' understanding of the topic. The offline group conducted the college exam in two classes while the online group conducted the test in an online format on the website www.examus.com. The number of math tasks was the same for both groups to ensure uniformity in data collection. The test was conducted during two math lessons in the last week of the study and lasted 70 minutes.

Results

Table 1

Group Statistics

Groups		N	Mean	Std. deviation	Std. error mean
Results	Offline	58	80.97	11.113	1.459
	Online	58	76.17	14.650	1.924

Table 1 indicates that the offline studied group's scores are higher than that of the group which studied online.

As can be seen from Table 1, the average score in the offline group scores (80.97) is higher than in the online group (76.17). This indicates the superiority of offline learning. In order to avoid misconceptions in descriptive statistics, we conducted inferential statistics (that is independent t-test) to identify any statistically significant differences.

Table 2

Independent Samples Test

		Levene's test for equality of variances		T-test for equality of means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean difference	Std. error difference	95% confidence interval of the difference	
									Lower	Upper
Results	Equal variances assumed	4.965	0.028	1.985	114	0.050	4.793	2.415	0.010	9.576
	Equal variances not assumed			1.985	106.281	0.050	4.793	2.415	0.006	9.580

It follows from the results that the average value for the class who studied offline was 81, while the average value for the online class was 76 (see Table 1). This indicates that students' academic performance in the offline system was much higher than in the online system. However, statistical significance was also found.

According to the analysis of the statistical data obtained, a significant difference was found between online and offline math training, since $p = 0.050$.

Discussion

Based on the analysis, the average value of an offline format is much higher than the average value of a group of online formats. To avoid confusion, we conducted an independent t-test for average scores to compare them statistically, and found that there was a statistical difference, since $p = 0.050$. It follows from this analysis that there is a significant difference between the achievements of students in an offline group and an online group in the study of mathematics.

Conclusion

In this study, we came to the conclusion that there was a significant difference in student performance between the offline learning mode and the online learning mode. The offline teaching method was more effective for improving students' understanding and comprehension of the topic in mathematics. The results of the t-test and the average indicators of both groups showed that there are significant advantages of one way of learning over the other, which indicates that students attending classes in educational institutions in offline mode are more effective than those who study in online platforms, taking online courses. But still, we recommend conducting additional research on online and offline research to determine more effective ways to implement both methods to maximize student satisfaction in learning mathematics, to increase the level of development of students.

Limitations

In this research paper, the tool used may not have been effective enough to determine the real difference

between online and offline research on a larger scale. More research is needed to improve online learning and introduce offline learning. Also try other research tools.

References

Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49*(1), 5-22.

James, G. (2002). Advantages and disadvantages of online learning. Retrieved from https://www.comminit.com/ict-4-development/content/advantages-and-disadvantages-online-learning

Kaymak, S., Esengeldi, M., Aisholpan, O., Mbala, O., & Zhaudir, K. (2021). Comparison between offline learning and online learning. *IAI Academic Conference Proceedings, 2671(3179).* Retrieved from https://www.researchgate.net/publication/350604123_COMPARISON_BETWEEN_OFFLINE_LEARNING_AND_ONLINE_LEARNING

McBrien, J. L., Cheng, R., & Jones, P. (2009). Virtual spaces: Employing a synchronous online classroom to facilitate student engagement in online learning. *International Review of Research in Open and Distributed Learning, 10*(3), 1-17.

Pei, L., & Wu, H. (2019). Does online learning work better than offline learning in undergraduate medical education? A systematic review and meta-analysis. *Medical Education Online, 24*(1), 1666538.

Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). Online education: Worldwide status, challenges, trends, and implications. *Journal of Global Information Technology Management, 21*(4), 233-241.

Singh, V., & Thurman, A. (2019). How many ways can we define online learning? A systematic literature review of definitions of online learning (1988-2018). *American Journal of Distance Education, 33*(4), 289-306.