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Effect of Blended Learning Strategy on Learning Outocmes in Science among Secondary School Students

Manpreet Kaur[1*], Parminder Kaur[2]
[1]Panjab University, Jalandhar
[2]Director, Lyallpur Khalsa College, Jalandhar
Corresponding Author: Manpreet Kaur Manpreetrajpalbedi@gmail.com

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A B S T R A C T

Learning should be ingrained with the creation of original academic work using a thoughtful blend of techniques. The educational process has altered in the digital age to meet the needs of our "digital natives." Today, online and offline learning are employed in tandem depending on the needs and learning styles of the students. Blended learning is the result of combining various learning modalities. This approach goes beyond the typical speed, location, and style of instruction. It gives the flexibility to the education system. It is reducing all types of situational obstacles and expanding the learning environment with a wide range of novel methods, tools, and ideas. Blended learning modules were created to investigate the impact of this method on secondary school students' attitudes toward science. A quasi-experimental approach was used, with one group being the control group that received standard care and the other being the experimental group that participated in the integrated learning strategy. The t-test was used to analysed the data. It was determined that secondary school pupils' gain scores for learning outcomes in science range significantly from one another.

INTRODUCTION

Education refers to a student's holistic growth. The goal of the educational system is to make sure that students have mastered the abilities and behaviors that enable them to become good people who can deal with the emotional, physical, and mental issues in their own lives as well as those of society. The aim of education is to adopt new methods so that students' cognitive, communicative, and affective domains of behavior can be altered. The use of blended learning, which combines traditional methods with new technologies and methodologies, may readily educate students for the twenty-first century so they can study and apply their learning effectively.

LITERATURE REVIEW

Blended Learning

A pedagogical approach that combines different methods, and strategies to promote a child's holistic development. This will enable the student to learn at his or her own speed and level of comprehension.

In the NEP (2020), blended learning was emphasized. In accordance with their needs, pace, and interests, students can study via blended learning, which is a type of learning. Since every person is different and unique, blended learning enables people to study in accordance with their aptitudes and areas of interest. This promotes lifelong learning and results in positive behavior change.

Learning Outcomes

The assertions that outline what students will learn or accomplish at the conclusion of a session or course are known as learning outcomes. It is not sufficient for students to simply know and comprehend the lesson; they also need to be able to articulate the knowledge and information they have learned. These serve as the direction for carrying out a lesson plan. They help teachers and students understand the best course of action and the practical applications of newly learned knowledge and abilities. The teaching-learning process should contain the things that are indicated by the learning outcomes. Learning outcomes help students understand why the knowledge and skills are beneficial to them and how they may use them in their daily lives.

Learning outcomes describe what pupils are able to comprehend, do, apply in their daily lives, and to what extent they are able to do so. The students are able to use their concepts in a different setting. They assist in creating the quantifiable assessment.

According to Jenkins and Unwin (1996), learning outcomes are expectations for what a learner should be able to perform as a result of a learning activity.

Objectives

The objectives of the study are to develop the modules on blended learning strategy and to frame a questionnaire for learning outcomes in science to find out the effectiveness of blended learning strategy on learning outcomes in science among secondary school students. The hypothesis is to find the

effectiveness of blended learning strategy on Learning Outcomes in Science among secondary school students.

METHODOLOGY

The design of the current investigation is in the form of a quasi-experiment. 200 pupils were included in the sample. The sample was split equally between the experimental and control groups. Pre-testing the sample was done using the science learning outcomes questionnaire that an investigator had prepared, and post-testing was done using the blended learning technique. To help the kids learn effectively, a web link was made. The website connection also had games, assessments, and ppt files. While the control group received traditional instruction, the experimental group was taught using a blended learning technique.

RESEARCH RESULT AND DISCUSSION

The following table shows the Summary of 't' test analysis to compare the Learning Outcomes in Science Gain scores of Experimental Group and Control Group. This analysis was done to determine the impact of learning outcomes in science among secondary school students.The descriptive analysis about the Gain scores data for the variable Learning Outcome in Science for Experimental and Control Group has been presented in the table below:

Table 1: Descriptive statistics for Learning Outcomes in Science Gain scores of Control and Experimental Group

Group	N	Mean	Standard Deviation	Skewness	Kurtosis
Control Group	100	1.56	1.88	-.332	.621
Experimental Group	100	8.52	3.34	.518	.926

Interpretation: The descriptive statistics of the gain scores for the experimental and control groups of scientific learning outcomes are shown in the above table. The experimental group's mean score is 8.52 and the control group's mean score is 1.56. Standard deviations for the experimental and control groups are 1.88 and 3.34, respectively. Gain score skewness for the control group and experimental group is -.332&.518; gain score kurtosis for the two groups is.621 and.946. Hair et.al (2010) and Bryne (2010) recommends that the data will be considered normal if skewness is between -2 to +2 and kurtosis is between -7 to +7. Since the values for skewness and kurtosis are within the acceptable range therefore the data can be considered to be normally distributed for the gain scores of experimental and control group on learning outcomes in science.

Graphical Representation for Gain scores for Learning Outcomes in Science for Control and Experimental Group: The figure below depicts the Graphical Representation for the mean Gain scores for Learning Outcomes in Science for Experimental and Control Group.

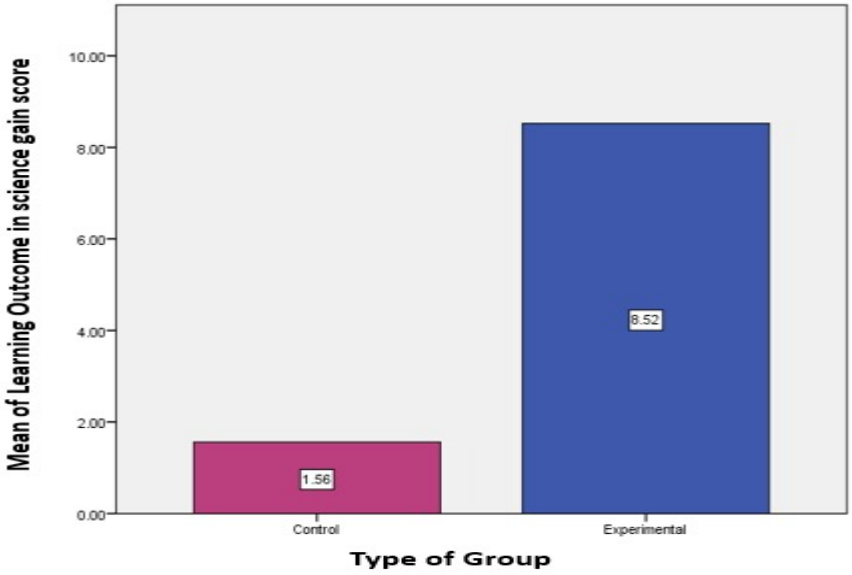

Fig 1. Graphical Representation for the mean Gain scores for Learning Outcomes in Science for Experimental and Control Group

Interpretation: The mean Gain Scores for the experimental and control groups on the Learning Outcomes in Science are shown in the image above. In terms of the Learning Outcomes in Science, the mean Gain scores of the Experimental group (N-100) are 8.52, whereas those of the Control group (N-100) are 1.56.

Table 2 : Summary of 't' test Analysis to Compare the Learning Outcomes in Science Gain scores of Control and Experimental Group

Learning Outcomes in Science	Category	N	Mean	Std. Dev.	't' value	'p' value	Result
Gain Scores Analysis	Control Group Gain Scores	100	1.56	1.88	-18.365	.000	Significant at .05 level
	Experimental Group Gain Scores	100	8.52	3.34			

Interpretation: Further, the comparison of the Learning Outcomes in Science based on Gain Scores showed that the mean of the Control group's Learning Outcomes in Science Gain score (N-100) is 1.56 with a standard deviation of 1.88, while the mean of the Experimental group's Learning Outcomes in Science Gain score (N-100) is 8.52 with a standard deviation of 3.34. The p value is 0.000, whereas the t value is -18.365. The t value will be regarded as significant because the p value is smaller than.05. It shows that there are

substantial differences between the experimental and control groups' mean Gain scores for the learning outcomes in science. In compared to their peers, the students who represent the Experimental group had significantly higher Gain scores for the Learning Outcomes in Science. Circumstantial evidence that the blended learning technique has been successful in improving secondary school students' learning outcomes in science is shown by the significant difference in mean gain scores for the experimental and control groups on the learning outcomes for science. The significant difference is real and cannot be attributed to random chance or sampling flaws. The experimental group's mean score difference is 8.5, which is eight times greater than the control group's mean score difference of 1.56, indicating a significant difference in favor of the experimental group. The t-value for the experimental group is 18 times larger than the t-value for the control group

CONCLUSIONS AND RECOMMENDATIONS

From the above results it can be concluded that the blended learning is very effective for the secondary school students. It can be concluded that there is a significant difference in the mean of the gain scores of learning outcomes in sciences and blended learning is effective among secondary school students. Overall it can be concluded that the Blended Learning Strategy is effective in improving the Learning Outcomes in Science of the secondary school students. Similar findings have been reported by Kintu and Zhu (2017) who reported that blended learning is effective by analyzing the relationship between student characteristics, design features and learning outcomes. Krishnan (2013) also found that the effectiveness of blended learning is more than the conventional method in 166 enhancing science process skills and science achievement among secondary school students and science learning can be optimise at secondary level by using blended learning. The blended Learning Strategies must be suitably inculcated into the curriculum because it will enhance the Learning Outcomes in Science of the secondary school students.

ADVANCED RESEARCH

In writing this article the researcher realizes that there are still many shortcomings in terms of language, writing, and form of presentation considering the limited knowledge and abilities of the researchers themselves. Therefore, for the perfection of the article, the researcher expects constructive criticism and suggestions from various parties.

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