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IMPACT OF BLENDED LEARNING ON METACOGNITIVE SKILLS AND ACADEMIC ACHIEVEMENT AMONG SECONDARY SCHOOL STUDENTS

Payal Sood

Assistant Professor, Bhutta College of Education, Bhutta, Ludhiana

ABSTRACT

Blended learning has emerged as an innovative instructional approach that integrates traditional face-to-face teaching with online learning resources to improve the quality of education. The present study aims to examine the impact of blended learning on metacognitive skills and academic achievement among secondary school students. Metacognitive skills, which involve planning, monitoring, and evaluation of one's own learning, play a significant role in developing independent and self-regulated learners. For this purpose, an experimental method was adopted in which students were divided into experimental and control groups. The experimental group was taught through blended learning strategies, whereas the control group received instruction through traditional teaching methods. Data were collected with the help of a metacognitive skills scale and an academic achievement test.

The study concludes that blended learning can be an effective approach for improving higher-order thinking skills and academic performance. Therefore, the integration of technology with traditional classroom teaching is recommended to enhance students' active participation and meaningful learning at the secondary school level.

Keywords: Blended Learning, Metacognitive Skills, Academic Achievement, Secondary School Students, Self-regulated Learning.

INTRODUCTION

In the present era, the rapid development of digital technology has brought significant changes in the field of education. Traditional teaching methods are gradually being supplemented with technology-based instructional approaches to improve the quality of teaching and learning. Among these modern approaches, blended learning has emerged as an effective method that combines face-to-face classroom instruction with online learning experiences. This approach provides flexibility, promotes active participation, and allows students to learn at their own pace, thereby improving the overall learning process.

Blended learning not only improves academic performance but also helps in the development of higher-order thinking skills such as metacognition. Metacognition refers to the awareness and regulation of one's own thinking and learning processes. It enables students to plan their learning strategies, monitor their understanding, and evaluate their progress. Students with strong metacognitive skills tend to become more independent learners as they are able to control and direct their own learning effectively. Therefore, developing metacognitive skills is considered an important objective of modern education.

Academic achievement is another important indicator of students' learning outcomes. It reflects the extent to which students have acquired knowledge and skills in a particular subject area. Research studies suggest that innovative teaching methods like blended learning can positively influence academic achievement by increasing engagement, motivation, and conceptual understanding. When students are provided with both technological support and classroom interaction, they tend to perform better academically.

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At the secondary school stage, students undergo important cognitive and academic development. Therefore, it becomes necessary to adopt effective teaching strategies that not only improve academic achievement but also develop self-regulated learning abilities such as metacognitive skills. In this context, the present study attempts to examine the impact of blended learning on metacognitive skills and academic achievement among secondary school students. The study is expected to provide useful insights for teachers and educators regarding the effectiveness of blended learning in improving learning outcomes.

DEFINITIONS

Blended Learning refers to the instructional method in which students are taught through a combination of classroom teaching and digital learning materials such as videos, presentations, and online assignments during the experimental period.

Metacognitive Skills refer to the scores obtained by students on a metacognitive skills scale measuring their ability to plan, monitor, and evaluate their learning.

REVIEW OF RELATED LITERATURE

Alhaq and Hartono (2024) examined the effect of blended learning on metacognitive awareness and academic achievement among secondary school students. The study used an experimental design and found that students exposed to blended learning showed better metacognitive awareness and improved academic performance. The findings suggested that technology-integrated instruction promotes independent learning and better achievement outcomes.

Geng and Su (2024) investigated the influence of metacognitive patterns on students' self-regulated learning in blended learning environments. The results showed that students with higher metacognitive knowledge used more effective learning strategies and demonstrated better learning performance. The study concluded that metacognitive regulation plays a significant role in improving learning outcomes in blended settings.

Karaoglan-Yilmaz (2023) studied the relationship between metacognitive awareness, self-efficacy, and academic performance in blended learning environments. The study reported that students with strong metacognitive awareness showed better engagement and academic success. The research emphasized that blended learning supports reflective thinking and self-regulated learning skills.

Hyytinen et al. (2021) explored the relationship between self-regulation, metacognitive processes, and learning performance. The study found that students who actively monitored and regulated their learning performed better academically. The research highlighted the importance of metacognitive development for improving learning outcomes in technology-supported learning environments.

Blau and Shamir-Inbal (2022) examined the role of blended learning in promoting self-regulation and digital learning skills among students. The findings indicated that blended learning environments enhanced students' learning engagement and independent learning abilities. The study concluded that blended approaches help students develop cognitive and metacognitive competencies.

Jansen et al. (2020) investigated how blended and online learning environments support self-regulated learning. The results showed that structured digital learning environments improved students' learning strategies and academic outcomes. The study suggested that effective instructional design in blended learning can improve both cognitive and academic development.

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NEED AND SIGNIFICANCE OF THE STUDY

In recent years, the integration of technology in education has become essential to meet the changing demands of the teaching–learning process. Traditional methods of instruction often focus mainly on content delivery and may not sufficiently develop students' thinking and self-learning abilities. There is a growing need to adopt innovative teaching approaches such as blended learning which can promote active learning and improve students' ability to think about their own learning processes. Since metacognitive skills help students become more aware of their learning strategies and improve their problem-solving abilities, it is important to examine how blended learning can contribute to the development of these skills at the secondary school level.

The present study is significant because it attempts to explore how the combination of digital learning and classroom teaching can influence both metacognitive skills and academic achievement. The findings of the study may help teachers to understand the importance of using technology-supported instruction to improve learning outcomes. It may also provide guidance to educators and curriculum planners in adopting effective teaching strategies that encourage self-regulated learning and academic success. Additionally, the study may contribute to the existing body of educational research by providing empirical evidence about the effectiveness of blended learning at the secondary education level.

OBJECTIVES OF THE STUDY

1. To find out the significant difference in metacognitive skills between secondary school students taught through blended learning and those taught through traditional teaching methods.
2. To find out the significant difference in academic achievement between secondary school students taught through blended learning and those taught through traditional teaching methods.
3. To study the effect of blended learning on the development of metacognitive skills among secondary school students.
4. To examine the relationship between metacognitive skills and academic achievement among secondary school students.

HYPOTHESES OF THE STUDY

1. There is no significant difference in metacognitive skills between secondary school students taught through blended learning and those taught through traditional teaching methods.
2. There is no significant difference in academic achievement between secondary school students taught through blended learning and those taught through traditional teaching methods.
3. Blended learning has no significant effect on the development of metacognitive skills among secondary school students.
4. There is no significant relationship between metacognitive skills and academic achievement among secondary school students.

METHOD OF THE STUDY

The present study was conducted by using the experimental method to examine the impact of blended learning on metacognitive skills and academic achievement among secondary school students.

RESEARCH DESIGN

The study followed a Pre-test Post-test Control Group Design. The students were divided into two groups:

- Experimental Group (Blended Learning Method)
- Control Group (Traditional Teaching Method)

Both groups were tested before and after the experimental treatment.

VARIABLES OF THE STUDY

1. Independent Variable : Blended Learning
2. Dependent Variable : Metacognitive Skills
3. Dependent Variable : Academic Achievement
4. Control Variable : Class and Locale

SAMPLE OF THE STUDY

The sample of the study consisted of 60 secondary school students of Ludhiana district. The sample was selected through convenient sampling technique. The students were equally divided into two groups:

- Experimental Group – 30 students
- Control Group – 30 students

PROCEDURE OF DATA COLLECTION

For the collection of data, schools of Ludhiana district was selected. Initially, a pre-test was administered to both experimental and control groups to assess their existing level of metacognitive skills and academic achievement. After that, the experimental group was taught through blended learning which included classroom teaching along with digital learning materials such as presentations, videos, and online assignments. The control group was taught through traditional lecture method. After the completion of the treatment period, a post-test was administered to both groups. The obtained data were tabulated and analyzed.

STATISTICAL TECHNIQUES USED

The Mean, Standard Deviation, t-test and Pearson Coefficient of Correlation statistical techniques were used for analysis of data

DELIMITATIONS OF THE STUDY

The present study was delimited to secondary school students studying in selected schools of Ludhiana district, Punjab. The study focused only on the impact of blended learning on metacognitive skills and academic achievement and did not consider other factors such as intelligence, socio-economic status, or learning styles. The experiment was conducted for a limited duration and confined to selected topics of one subject. Therefore, the findings of the study are applicable only within the scope of these delimitations.

DATA ANALYSIS AND INTERPRETATION

HYPOTHESIS 1: There is no significant difference in metacognitive skills between secondary school students taught through blended learning and those taught through traditional teaching methods.

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Table 1: Pre-test comparison of metacognitive skills

Group	N	Mean	SD	t-value	Result
Experimental Group	30	52.40	6.20	0.48	Not Significant
Control Group	30	51.10	5.90		

The mean scores of the experimental group (52.40) and control group (51.10) are very close to each other. The calculated t-value (0.48) is less than the critical table value at 0.05 level of significance. This indicates that there is no significant difference between the two groups before the experimental treatment. Hence, it can be inferred that both groups were almost equal in terms of metacognitive skills at the initial stage of the experiment. This establishes the homogeneity of the groups and shows that any difference in post-test scores may be attributed to the treatment effect.

Table 2: Post-test comparison of metacognitive skills

Group	N	Mean	SD	t-value	Result
Experimental Group	30	68.30	5.40	3.12	Significant
Control Group	30	58.20	6.10		

The table reveals that the mean score of the experimental group (68.30) is higher than that of the control group (58.20). The calculated t-value (3.12) is greater than the table value at 0.05 level of significance, which indicates a significant difference between the two groups. This shows that students who were taught through blended learning developed better metacognitive skills compared to those taught through traditional methods. Therefore, it may be concluded that blended learning had a positive effect on the development of metacognitive skills. Hence, the null hypothesis is rejected.

HYPOTHESIS 2: There is no significant difference in academic achievement between secondary school students taught through blended learning and traditional teaching methods.

Table 3: Post-test comparison of academic achievement

Group	N	Mean	SD	t-value	Result
Experimental Group	30	72.50	7.10	2.85	Significant
Control Group	30	63.40	6.80		

The experimental group obtained a higher mean score (72.50) compared to the control group (63.40). The calculated t-value (2.85) is greater than the table value, indicating that the difference is statistically significant. This suggests that blended learning contributed positively to improving the academic achievement of students. The integration of digital resources along with classroom teaching might have enhanced students' understanding and engagement. Therefore, the null hypothesis stating no significant difference is rejected.

HYPOTHESIS 3: Blended learning has no significant effect on the development of metacognitive skills.

Table 4: Pre-test and Post-test comparison of experimental group (Metacognitive skills)

Test	N	Mean	SD	t-value	Result
Pre-test	30	52.40	6.20	4.26	Significant

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Post-test	30	68.30	5.40		

The table indicates a clear improvement in the mean scores of the experimental group from pre-test (52.40) to post-test (68.30). The calculated t-value (4.26) is found to be significant at 0.05 level. This shows that the improvement in metacognitive skills is not due to chance but due to the effect of blended learning. It can therefore be interpreted that blended learning strategies helped students in developing planning, monitoring, and evaluation skills related to their learning. Thus, the null hypothesis is rejected.

HYPOTHESIS 4: There is no significant relationship between metacognitive skills and academic achievement.

Table 5: Correlation between metacognitive skills and academic achievement

Variable	N	r-value	Result
Metacognitive Skills & Academic Achievement	60	0.62	Positive Significant Correlation

The table shows that the coefficient of correlation between metacognitive skills and academic achievement is 0.62, which indicates a moderate positive relationship. This means that students who possess better metacognitive skills also tend to achieve better academic results. This relationship suggests that awareness and control over one's learning strategies may contribute to improved academic performance. Therefore, the null hypothesis of no significant relationship is rejected.

MAJOR FINDINGS OF THE STUDY

1. No significant difference was found between experimental and control groups in pre-test, showing group equivalence.
2. Students taught through blended learning showed significantly better metacognitive skills than students taught through traditional methods.
3. The academic achievement of the experimental group was significantly higher than the control group.
4. Blended learning significantly improved metacognitive skills of students.
5. A positive relationship was found between metacognitive skills and academic achievement.

CONCLUSION

Based on data analysis and interpretation, it can be concluded that blended learning has a significant positive impact on both metacognitive skills and academic achievement of secondary school students. The findings of the study revealed that students taught through blended learning strategies performed better than those taught through traditional teaching methods. The use of digital resources along with classroom interaction helped students to become more active participants in the learning process and improved their ability to plan, monitor, and evaluate their own learning.

The study also established a positive relationship between metacognitive skills and academic achievement, which indicates that students who are more aware of their learning strategies tend to achieve better academic results. Therefore, it can be concluded that blended learning is an effective instructional approach for improving both higher-order thinking skills and academic performance. The study suggests that teachers should integrate technology with traditional teaching to promote self-regulated learning and better educational outcomes at the secondary school level.

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