



Effectiveness of a Bilingual Teaching and Learning Strategy on the Academic Achievement of Students in Social Sciences

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Abstract

This study investigates the effectiveness of bilingual teaching and learning strategies on students' academic achievement in Social Sciences at the middle school level. India being a multilingual nation, language is both a bridge and a barrier to learning. The research explores how this diversity can potentially benefit the teaching learning process. Thus, a single-group pre-test and post-test quasi-experimental design involving twenty students from a private middle school in Hyderabad was employed. Structured bilingual achievement tests were administered in both English and Telugu to evaluate academic performance that included conceptual understanding, application skills, information processing, mapping, and analytical abilities. Statistical analysis focused on mean comparison and *t*-tests. The results revealed significant improvements in students' academic achievement, conceptual comprehension, information skills, and mapping abilities after exposure to bilingual instruction. The findings highlight the pedagogical advantages of integrating students' first language (L1) with the second language (L2) to enhance conceptual clarity and engagement. The study situates its findings within the framework of Vygotsky's sociocultural theory and Cummins' linguistic interdependence hypothesis, aligning them with the National Education Policy (NEP) 2020, which promotes multilingual education. Despite limitations such as small sample size and lack of a control group, the study offers strong evidence supporting bilingual pedagogy as a tool for inclusive, effective, and equitable education. Recommendations are made for teacher training, curriculum reform, and policy advocacy to institutionalize bilingual teaching at the school level.



1. Introduction

Language serves as the foundation of all learning. In multilingual societies like India, where students come from diverse linguistic backgrounds, the language of instruction plays a crucial role in determining educational outcomes. Bilingual education, the use of two languages in teaching and learning—has gained prominence as an inclusive pedagogical approach that enhances comprehension, cultural identity, and cognitive flexibility.

The National Education Policy (NEP) 2020 strongly advocates for the use of the mother tongue or regional language as the medium of instruction, particularly at the primary and middle school levels. This aligns with global recommendations from UNESCO (2020), which emphasize that learners learn best in their first language. However, the transition from regional languages to English-medium education often creates challenges, especially in subjects like Social Sciences, which require conceptual understanding, interpretation, and analytical skills.

This study titled “*Effectiveness of Bilingual Teaching and Learning Strategies on Students’ Academic Achievement in Social Sciences*” was undertaken to examine how bilingual instruction can improve students’ understanding and performance in the Social Sciences. It aims to validate the pedagogical value of bilingual education and explore its implications for classroom practice, teacher preparation, and educational policy in India.

2. Objectives of the Study

1. To study the effectiveness of bilingual teaching and learning on the academic achievement of learners at the middle school level.
2. To analyze the effectiveness of bilingual teaching and learning concerning different academic standards in Social Sciences.
3. To recommend strategies for implementing bilingual pedagogy in Social Sciences classrooms.

3. Hypotheses of the Study

H₁: There is a significant difference in academic achievement of students upon application of bilingual teaching and learning strategies in Social Sciences.

H₂: There is a significant difference in conceptual understanding of Social Science subjects among students after bilingual instruction.



H₃: There is a significant difference in application skills of students taught through bilingual strategies.

H₄: There is a significant development of information processing skills in Social Sciences following bilingual instruction.

H₅: There is a significant difference in mapping and reflective skills among students exposed to bilingual teaching.

H₆: There is a significant difference in analytical skills among students taught through bilingual teaching strategies.

4. Research Methodology

The study adopted a single-group pre-test and post-test quasi-experimental design to measure changes in students' achievement before and after the implementation of bilingual teaching strategies, although the absence of a control group limited the scope for comparison. The sample consisted of 20 Grade 6 students from a private middle school in Hyderabad, representing a typical multilingual classroom where Telugu was the dominant home language and English was the medium of instruction. A structured bilingual achievement test in English and Telugu was developed to assess students' knowledge and skills in Social Sciences across multiple cognitive domains, including conceptual understanding, application, information processing, mapping, and analysis. The tool's reliability and validity were ensured through expert review and pilot testing, and t-values were used to test statistical significance. The procedure involved administering a pre-test to establish baseline achievement, followed by the implementation of bilingual teaching strategies for a selected instructional unit in Social Sciences, where both English and Telugu were used for teaching, explanation, and assessment. After the intervention, a post-test was conducted to measure learning outcomes. The collected data were analyzed using descriptive statistics, such as mean and standard deviation, and inferential statistics, particularly the t-test, to determine the significance of differences between pre-test and post-test scores across the identified domains.

Intervention

The intervention programme was implemented to examine the effectiveness of bilingual teaching-learning strategies in improving students' academic achievement in Social Sciences. The programme focused on the unit of early human life and was designed around activity-



based, collaborative, and bilingual classroom practices. Instruction was delivered using both English and the learners' home language to support comprehension, vocabulary development, and active participation. The major themes covered during the intervention included timeline and chronology, hunter-gatherer life, discovery of fire, stone tools and technology, cave art and early communication, early settlements, environment and survival, clothing and shelter, migration, and the role of archaeologists. A variety of learner-centred activities such as role-play, model-making, map work, drawing, labelling, mock excavation, group discussion, and oral presentation were used to make abstract historical concepts more concrete and meaningful. Students were encouraged to use bilingual vocabulary, code-switching, and peer discussion while explaining concepts, presenting group work, and labelling models or diagrams. Continuous classroom observation was carried out to assess learner engagement, collaboration, conceptual understanding, use of both languages, creativity, and communication skills. The intervention aimed to strengthen students' understanding of early human life while also developing historical thinking, spatial awareness, environmental awareness, oral expression, and confidence in learning Social Sciences through a bilingual approach.

5. Results and Discussion

Hypothesis-wise analysis

H₁: There is a significant difference in academic achievement of the student on application of bilingual teaching learning strategy in Social Sciences.

Table 1: Mean, S.D and t-value of academic achievement after a bilingual teaching intervention in Social Sciences

Test	N	Mean	S.D	t-Value	Level of Significance
Pre test	20	13.2	1.88	6.18	Sig at .05 level
Post test	20	15.3	1.83		
<i>r- value = .66</i>		<i>df = 19</i>		<i>t-value = 1.72</i>	

Interpretation:

Table 1 presents the results of the pre-test and post-test academic achievement scores in Social Sciences for students who received bilingual teaching intervention. The mean score on the pre-

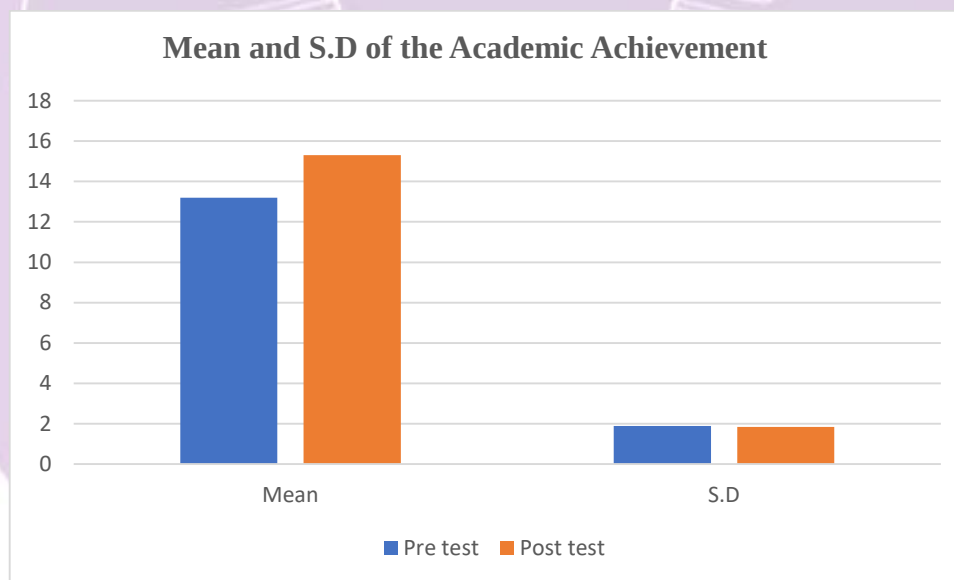


test was 13.2 with a standard deviation of 1.88, while the post-test mean increased to 15.3 with a slightly lower standard deviation of 1.83. The computed t -value for the difference between the pre-test and post-test scores is 6.18, which exceeds the critical value of 1.72 at 0.05 level of significance with 19 degrees of freedom.

This indicates that the difference between pre- and post-test scores is statistically significant. The calculated r -value of 0.66 also suggests a moderately strong positive correlation between pre- and post-intervention scores, reflecting consistent academic performance improvement among participants.

Thus, the null hypothesis is rejected and research hypothesis is accepted. It can be inferred that the bilingual teaching and learning strategy had a significant positive effect on students' academic achievement in Social Sciences.

Fig 1: Mean and S.D of the academic achievement scores for an intervention on bilingual teaching and learning strategy.



H₂ There is a significant difference in conceptual understanding of the Social Science subject among students on implementation of bilingual teaching learning strategy.



Table 2 Mean & S.D of conceptual understanding of the Social Sciences on implementation of bilingual teaching and learning strategy.

Test	N	Mean	S.D	t-Value	Level of Significance
Pre test	20	2.25	.55	3.32	Significant at .05 level
Post test	20	2.70	.47		
$r = .305$		$df = 19$		$t - Value = 1.72$	

Interpretation:

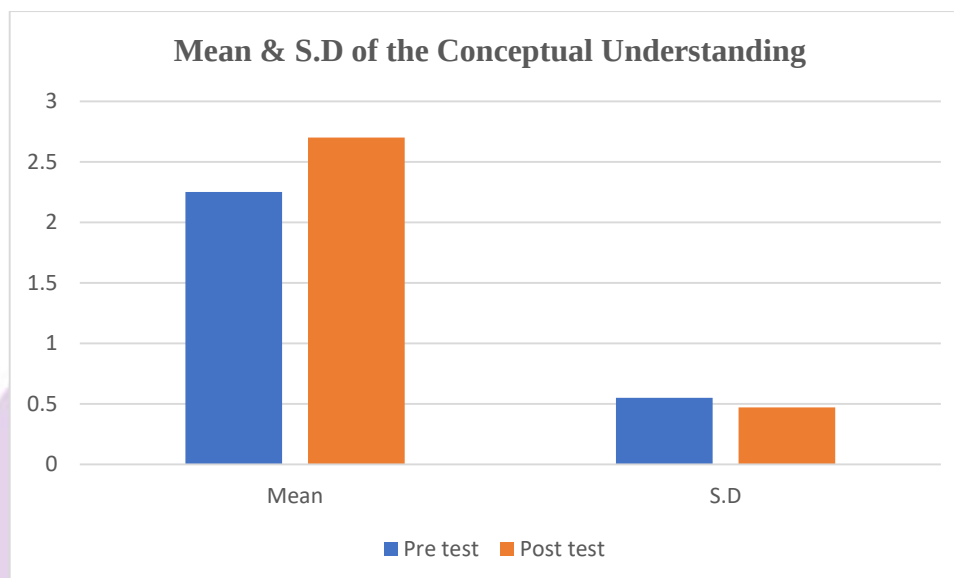
Table 2 presents the pre-test and post-test scores related to students' conceptual understanding of Social Sciences following the implementation of a bilingual teaching and learning strategy. The mean score increased from 2.25 in the pre-test to 2.70 in the post-test. The standard deviation decreased slightly from 0.55 to 0.47, indicating reduced variability in student responses after the intervention.

The computed t-value of 3.32 exceeds the critical value of 1.72 at the 0.05 level of significance with 19 degrees of freedom, confirming that the observed difference in means is statistically significant. This implies that the bilingual teaching strategy had a measurable and positive effect on students' conceptual understanding.

Although the correlation coefficient ($r = 0.305$) reflects a low positive correlation between the pre- and post-test scores, it still suggests some consistency in individual student progress.

Thus, the null hypothesis is rejected and research hypothesis is accepted. The findings indicate that bilingual instruction significantly improved students' conceptual grasp of Social Sciences topics, highlighting its effectiveness not only in rote achievement but also in fostering deeper understanding.

Fig 2 Mean & S.D of the conceptual understanding in the pre and post-test for bilingual teaching learning intervention



H₃: There is a significant difference in application of social science concepts among students in Social Sciences on implementation of bilingual teaching learning strategy.

Table 3 Mean & S.D of scores on application of social science concepts among students in Social Sciences on implementation of bilingual teaching learning strategy.

Test	N	Mean	S.D	T-Value	Level of Significance
Pre test	20	2.20	.61	1.00	Not significant at .05 level
Post test	20	2.35	.58		
<i>r = .305</i>		<i>df = 19</i>		<i>T-Value = 1.72</i>	

Interpretation:

Table 3 presents the results related to students' application of concepts in Social Sciences before and after the implementation of a bilingual teaching-learning strategy. The mean score in the pre-test was 2.20 with a standard deviation of 0.61, while the post-test mean slightly increased to 2.35 with a standard deviation of 0.58.

The computed t-value of 1.00 is less than the critical value of 1.72 at the 0.05 level of significance with 19 degrees of freedom, indicating that the difference in means is not

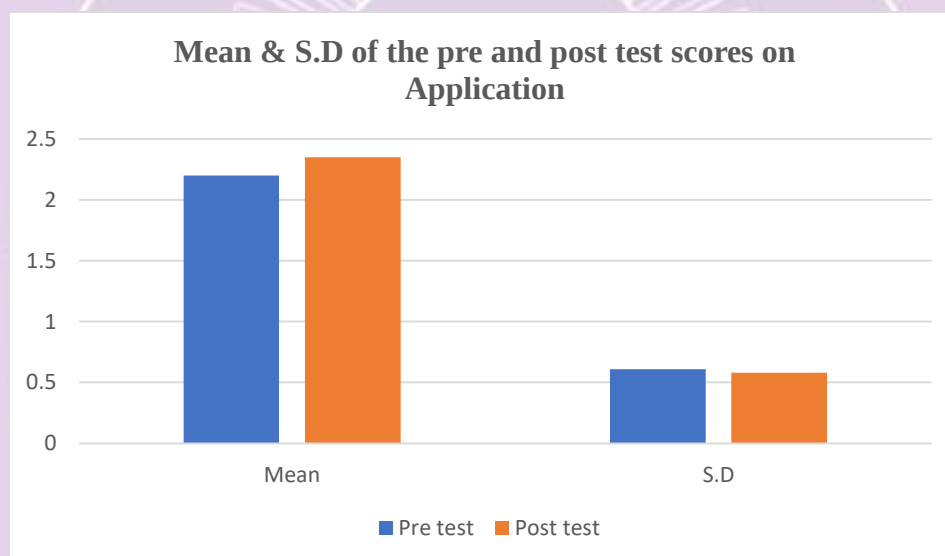


statistically significant. The correlation coefficient ($r = 0.305$) reflects a low positive relationship between pre- and post-test scores.

As the obtained t-value does not exceed the critical threshold, the null hypothesis (H_0) "There is no significant difference in application among students in Social Sciences on implementation of bilingual teaching-learning strategy" is accepted, and the research hypothesis (H_1) is rejected.

This suggests that while bilingual instruction showed improvement in conceptual understanding and achievement, it did not lead to a statistically significant improvement in the application of Social Science concepts within the scope and duration of this study.

Fig 3: Mean & S.D of the pre and post test scores on application for an intervention on bilingual teaching and learning strategy.



H_4 : There is a significant development of information skill among students in Social Sciences on implementation of bilingual teaching learning strategy.

Table 4: Mean & S.D of development of information skill among students in Social Sciences on implementation of bilingual teaching learning strategy.

Test	N	Mean	S.D	T-Value	Level of Significance
Pre test	20	2.30	.65	3.32	Significant at .05 Level
Post test	20	2.75	.55		

$r - value = .022$

$df = 19$

$t - value = 1.72$



Interpretation

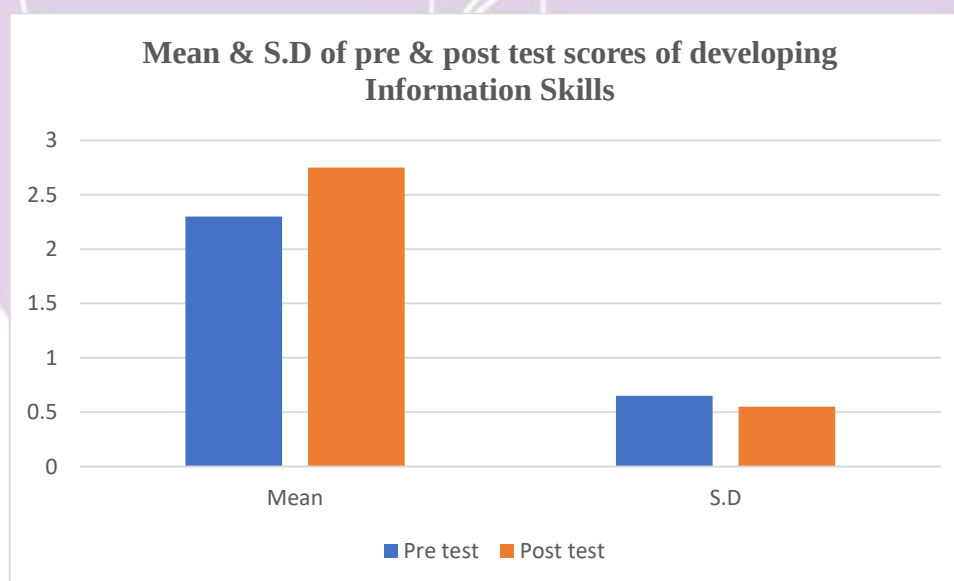
The table 4 presents the pre-test and post-test results regarding the development of information skills in Social Sciences following the implementation of a bilingual teaching-learning strategy. The mean score increased from 2.30 in the pre-test to 2.75 in the post-test, with standard deviations of 0.65 and 0.55 respectively. The reduction in standard deviation post-intervention indicates slightly more consistent performance among students.

The computed t -value of 3.32 is greater than the critical value of 1.72 at the 0.05 level of significance with 19 degrees of freedom, indicating that the observed difference in means is statistically significant.

Although the r -value of 0.022 indicates very low correlation between pre- and post-test scores, the significant t -value suggests that the bilingual teaching-learning strategy led to a notable improvement in students' information skills in Social Sciences.

As a result, the null hypothesis (H_0) is rejected, and the research hypothesis (H_1) is accepted. This confirms that bilingual instruction had a significant positive impact on the development of information-processing abilities among students.

Fig 4: Mean & S.D of pre & post test scores of developing information skills through an intervention on bilingual teaching learning strategies.



H₅: There is a significant difference in Mapping skills among students in Social Science subject on implementation of bilingual teaching learning strategy.



Table 5: Mean & S.D of scores on mapping skills among Social Science students on implementation of bilingual teaching learning strategy

Test	N	Mean	S.D	t-Value	Level of significance
Pre test	20	1.75	.44	5.94	Significant at .05 level
Post test	20	2.4	.59		
<i>r value = .006</i>		<i>df = 19</i>		<i>t-value = 1.72</i>	

Interpretation

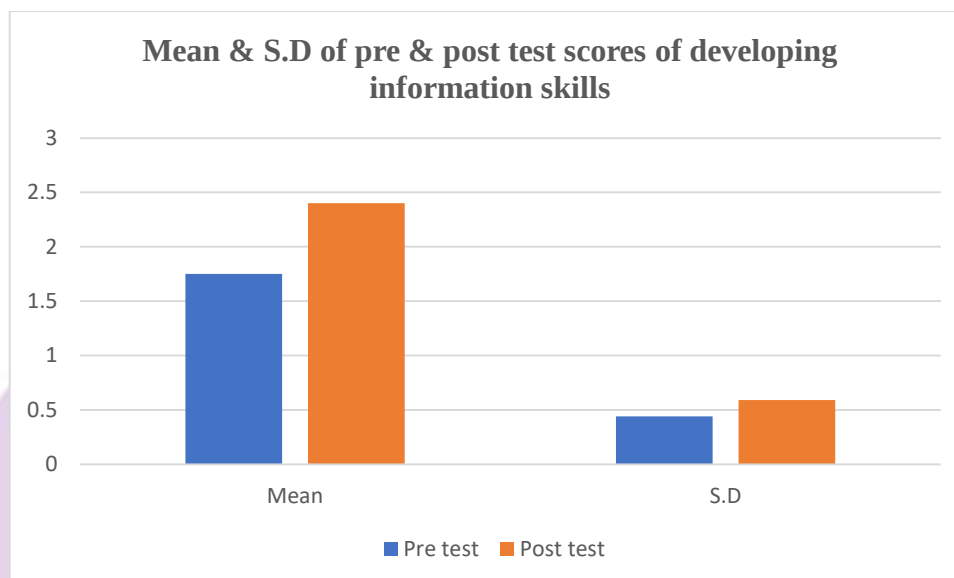
Table 5 presents the results of a pre-test and post-test comparison assessing students' mapping skills and reflective abilities in Social Sciences following a bilingual teaching-learning intervention. The mean score increased from 1.75 in the pre-test to 2.40 in the post-test. The standard deviation rose from 0.44 to 0.59, indicating a slightly wider range of scores after the intervention.

The calculated t-value of 5.94 is well above the critical t-value of 1.72 at the 0.05 level of significance with 19 degrees of freedom, demonstrating a statistically significant difference between pre- and post-test scores. Despite the very low r-value of 0.006, indicating almost no correlation between pre- and post-test scores, the magnitude of the change in mean scores points to a notable improvement across the group.

As the obtained t-value is statistically significant, the null hypothesis (H_0) which states that there is no significant difference in mapping skills and reflections is rejected, and the research hypothesis (H_5) is accepted.

This indicates that the implementation of a bilingual teaching-learning strategy had a significant positive impact on enhancing students' ability to use mapping skills in Social Science.

Fig 5 Mean & S.D of pre & post test scores of developing information skills through an intervention on bilingual teaching learning strategies.



H₆: There is a significant difference in skill of analysing among students in Social Science subject on implementation of bilingual teaching learning strategy.

Table 6: Mean & S.D of scores on analytical skills among Social Science students on implementation of bilingual teaching learning strategy

<i>Test</i>	<i>N</i>	<i>Mean</i>	<i>S.D</i>	<i>t-Value</i>	<i>Level of Significance</i>
Pre test	20	2.10	.71	1.83	Sig at .05 level
Post test	20	2.40	.59		
<i>r value = .392</i>			<i>df = 19</i>	<i>t-value = 1.72</i>	

Interpretation:

Table 6 displays the comparison between pre-test and post-test scores measuring students' skill of analysing in Social Science after the implementation of a bilingual teaching-learning strategy. The mean score increased from 2.10 (pre-test) to 2.40 (post-test), while the standard deviation decreased from 0.71 to 0.59, indicating a slight improvement in consistency of student performance post-intervention.

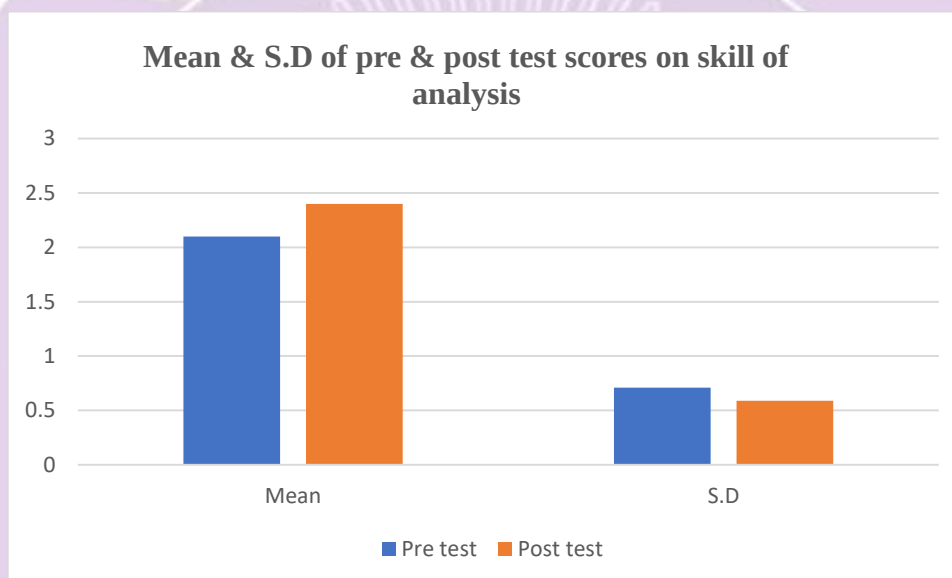
The obtained t-value of 1.83 is greater than the critical value of 1.72 at the 0.05 level of significance with 19 degrees of freedom, which indicates that the difference in scores is



statistically significant. The r -value of 0.392 suggests a low to moderate positive correlation between the pre-test and post-test scores, indicating that students who performed well initially also showed improvement post-intervention.

Since the calculated t -value exceeds the critical threshold, the null hypothesis (H_0) is rejected, and the research hypothesis (H_1) is accepted. This confirms that the bilingual teaching-learning strategy had a significant positive effect on enhancing students' analysing skills in Social Science.

Fig 6: Mean & S.D of pre & post test scores on skill of analysis through an intervention on bilingual teaching learning strategies.



The analysis indicates that the bilingual teaching strategy significantly enhanced academic achievement, conceptual understanding, and higher-order thinking skills such as information processing and reflection. Application-based skills showed improvement but were not statistically significant, suggesting that these may require longer-term interventions.

The results support Vygotsky's sociocultural theory, which emphasizes the role of language as a cultural tool in cognitive development (Vygotsky, 1978). Learning occurs through social interaction, and bilingualism enhances students' ability to bridge new knowledge with existing linguistic frameworks. Likewise, Cummins' (1979) linguistic interdependence hypothesis explains that proficiency in the first language supports second-language learning, enabling transfer of cognitive and conceptual skills between languages.



These results are consistent with earlier studies (Garcia, 2009; Baker & Wright, 2017) that affirm the positive role of bilingual education in enhancing comprehension and academic performance. In the Indian context, the findings align closely with NEP 2020, which encourages multilingualism as a foundation for cognitive development and equity in education.

6. Educational Implications

6.1 For Teachers

- Integrate bilingual pedagogical practices to facilitate understanding of complex Social Science concepts.
- Encourage code-switching and trans languaging as legitimate classroom practices that bridge L1 and L2 comprehension.
- Use culturally relevant examples and bilingual teaching aids to enhance engagement.
- Focus on skill-based activities that promote reflection, analysis, and interpretation.

6.2 For School Administrators

- Provide bilingual learning materials such as dual-language textbooks and visual aids.
- Conduct regular teacher training workshops on effective bilingual instructional methods.
- Create a linguistically inclusive environment where students can comfortably use both languages.
- Monitor bilingual pedagogy implementation and evaluate its impact on academic performance.

6.3 For Policy Makers

- Operationalize the NEP 2020 recommendation for multilingual education through a structured National Bilingual Curriculum Framework.
- Ensure equitable access to education by supporting learners from non-English backgrounds.
- Encourage research and pilot projects exploring bilingual and multilingual pedagogies across disciplines.



7. Limitations of the Study

1. The absence of a control group restricts the ability to attribute outcomes solely to the bilingual intervention.
2. The small sample size and short intervention duration limit the generalizability of results.
3. Testing effects and familiarity with assessment tools may have influenced post-test scores.
4. Context-specific variables, such as teacher style and linguistic proficiency, were not controlled.
5. Only cognitive and academic domains were studied; affective and behavioural outcomes were excluded.

8. Recommendations and Future Research

1. Conduct larger-scale studies with control groups for comparative analysis.
2. Extend the intervention period to capture long-term effects on application and analytical skills.
3. Explore bilingual instruction in other subjects such as Science and Mathematics.
4. Investigate learners' and teachers' perceptions of bilingual education to understand motivational and practical aspects.
5. Examine the role of digital tools and educational technology in supporting bilingual instruction.

9. Conclusion

The present study confirms that bilingual teaching and learning strategies substantially improve students' academic achievement and conceptual understanding in Social Sciences. The integration of the mother tongue with English as the medium of instruction reduces linguistic barriers, enhances comprehension, and builds learner confidence.

These results reinforce the educational philosophy that language should act as a facilitator of learning, not an obstacle. When students are encouraged to learn through languages they understand, cognitive load decreases, participation increases, and conceptual mastery deepens. The findings also validate the goals of NEP 2020, which envisions multilingual education as a key pathway toward inclusive and equitable quality learning.



Although the study's limitations restrict broad generalization, the implications are profound: bilingual education can transform classrooms into spaces of linguistic diversity, cultural relevance, and cognitive empowerment. Future educational reforms should integrate bilingual pedagogy as a central element of curriculum and teacher training, thus bridging the gap between policy vision and classroom practice.

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