# Language Proficiency as a Predictor of Science Achievement in Government School Boy and Girl Students at Secondary Level

Rama Sharma[1], Dr Jitendra Kumar Tiwari[2], Dr Abhishek Srivastava[3]

[1]Research Scholar, School of Education, Career Point University, Kota, Rajasthan
[2]Professor, School of Education, Career Point University, Kota, Rajasthan
[3]Professor, School of Education, Shri Rawatpura  Sarkar  University, Raipur

## ABSTRACT

**This study investigates the role of Hindi language proficiency as a predictor of science achievement among boys and girls in government schools. Language proficiency, particularly in the medium of instruction, is crucial for students' comprehension of scientific concepts, reading complex texts, and effectively communicating their understanding. In government schools, where resources may be limited, Hindi language proficiency can significantly influence students' academic performance in science, as science education heavily relies on language skills. The research examines the correlation between Hindi proficiency and science achievement, focusing on gender differences in this relationship. Data was collected from government school students, assessing their language proficiency through standardized tests and evaluating their science achievement based on academic performance. The results suggest that higher Hindi language proficiency is positively associated with better science performance for both boys and girls. However, girls were found to generally have higher language proficiency, which contributed to better performance in science. The study highlights the importance of integrating language development into science education, especially in government schools, to bridge achievement gaps. The findings emphasize the need for targeted interventions to improve language skills, which in turn can enhance science achievement, particularly in underserved educational settings.**

**Keywords: Language Proficiency, Science Achievement, Government Schools, Secondary Education, Hindi Language, Boys and Girls**

## INTRODUCTION

Language proficiency, particularly in Hindi, plays a vital role in determining academic achievement, especially in subjects like science, which require a clear understanding of complex concepts, technical terms, and instructions. In government schools, where resources and educational support may be limited, students' language skills can be a crucial factor in their success across various subjects, including science. Since Hindi is the medium of instruction in many government schools across India, students' proficiency in the language significantly impacts their ability to understand and engage with the science curriculum.

Science education often involves the comprehension of abstract concepts, reading scientific texts, interpreting data, and solving problems, all of which require strong language abilities. Students with a higher proficiency in Hindi are better equipped to understand these concepts, follow instructions, and articulate their thoughts clearly, which is essential for performing well in science subjects. On the other hand, students with lower language proficiency may struggle with understanding the scientific content, leading to poor performance in exams, experiments, and assignments.

This study seeks to explore the relationship between Hindi language proficiency and science achievement among boys and girls in government schools. By examining how language skills affect students' ability to perform in science, and how gender influences this relationship, the research aims to provide insights into how improving language proficiency can lead to better outcomes in science education. The findings of this study may help inform educational practices and policies that focus on enhancing both language and science skills, particularly in government schools where such support is often needed the most.

## LITERATURE REVIEW

According to **Vygotsky (1978),** language serves as a primary tool for cognitive development, meaning that language skills are directly linked to academic performance. In science, understanding concepts like chemical reactions, physical laws, and biological processes often involves complex language that requires high proficiency. **Kumar & Singh (2016)** argue that in Hindi-medium schools, students with strong language skills can better understand scientific content, engage with textbooks, and follow instructions effectively. **Chandra (2014)** explored how Hindi proficiency affected students' ability to understand science content in schools where Hindi was the medium of instruction **Mehta & Yadav (2015)** found that students in Hindi-medium government schools who lacked proficiency in Hindi faced considerable difficulties in understanding scientific concepts and solving related problems. **Sharma & Gupta (2017)** found that girls in Hindi-medium schools had higher language proficiency compared to boys, which contributed to their better performance in science**. Desai (2018)** examined gender differences in language proficiency and science achievement and concluded that girls' higher language proficiency facilitated better understanding and performance in science subjects. **Rajput & Yadav (2017)** found that students who were proficient in Hindi were more likely to succeed in science because they could better conceptualize abstract scientific ideas, such as the laws of motion or chemical reactions

### Objectives of the Study

- To study the relationship between learning achievement in science and Hindi language competency of Boys among Govt. Secondary school students;
- To study the relationship between learning achievement in science and Hindi language competency of Girls among Private Secondary school students.

### Hypothesis of the Study

- There is no significant difference between learning achievement in science and Hindi language competency of Boys among Govt. Secondary school students;
- There is no significant difference between learning achievement in     science and Hindi language competency of Girls among Govt. Secondary school students.

### Tool Used
To collect the requisite data for the present study, the investigator used Hindi achievement test prepared by Dr R.D. Singh and Dr. Madhuri Singh  and achievement in science on the basis of result of 10<sup>th</sup> class board.

### Sample
For the present study, a sample of 400 students was selected by using stratified random sampling and purposive sampling from Govt. schools of District Bilaspur of Himachal Pradesh.

### Variables of the Study
In the present study following variables are used;

### Independent variables;

- Boys and Girls  students
- Govt. Schools

### Dependent variables;
In the present study, Hindi achievement and Science achievement of secondary level  students as a dependent variables.

### Statistical Techniques Used For The Study
To achieve the objectives of the study and to test the hypothesis, the data collected were tabulated and mean, standard deviation and critical ratio were calculated.

## ANALYSIS AND INTERPRETATION

On the basis of data analysis and interpretation, the following main finding has emerged out of the present investigation.

**Table 1 Comparison of learning achievement in Science and Hindi Achievement Test of Boys among the Govt. Secondary School Students**

| VARIABLES | NO. | MEAN | SD | %AGE ERROR | CR VALUE | LEVEL OF SIG. |
|-----------|-----|------|-----|-----------|----------|---------------|
| SCIENCE ACHIEVEMENT | 200 | 76.66 | 10.79 | | | |
| HINDI ACHIEVEMENT TEST | 200 | 73.19 | 9.44 | 77.04 | 3.47 | SIGN. |

It is evident from the Table 1 that Mean score of science learning achievement is 76.66 and the mean score of Hindi Achievement test is 73.19. The obtained value of standard deviation of science learning achievement is 10.79 and value of standard deviation of Hindi Achievement test is 9.44. The calculated percentage error is 77.04. The obtained critical ratio value is 3.47 which is greater than that of table value for 198 df which is 1.96 at 0.05 level of significance. So there is significant difference between learning achievement of science and Hindi Achievement test of Boys among Govt. secondary level students.. So this **Hypothesis No. 1. is Rejected**. Mean difference of achievement is further graphically depicted in fig.1.
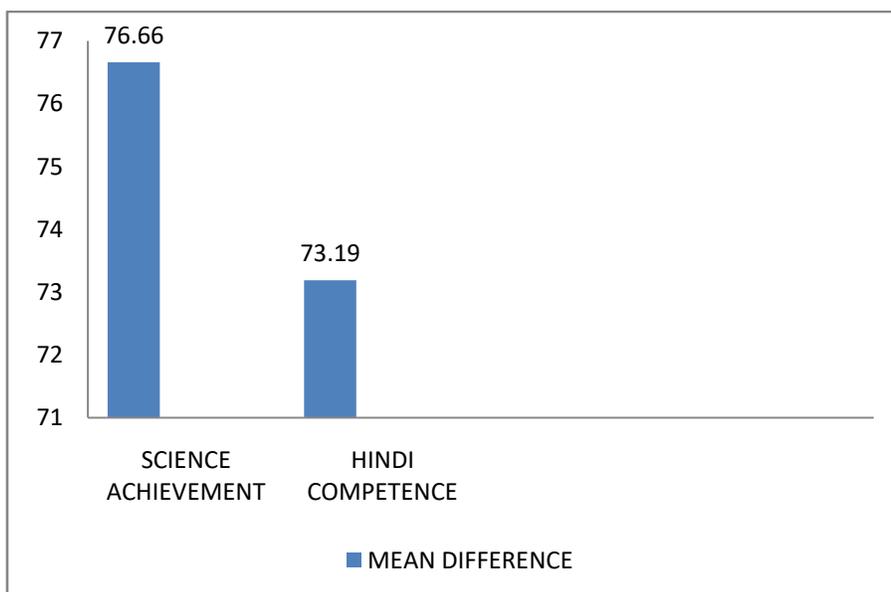


**Figure 1 Mean difference of Science achievement and Hindi Achievement Test of Boys among the Govt. secondary level students**

**Table 2 Comparison of learning achievement in Science and Hindi Achievement Test of Girls among the Govt. Secondary School Students**

| VARIABLES | NO. | MEAN | SD | %AGE ERROR | CR VALUE | LEVEL OF SIGN. |
|-----------|-----|------|-----|-----------|----------|----------------|
| SCIENCE ACHIEVEMENT | 200 | 81.24 | 8.53 | | | |
| HINDI ACHIEVEMENT TEST | 200 | 79.66 | 10.24 | -14.28 | 1.68 | NOT SIGN. |

It is evident from the Table 2.that Mean score of science learning achievement is 81.24 and the mean score of Hindi Achievement test is 79.66. The obtained value of standard deviation of science learning achievement is 8.53 and value of standard deviation of Hindi Achievement test is 10.24. The calculated percentage error is -14.28. The obtained critical ratio value is 1.68 which is less than that of table value for 198 df which is 1.96 at 0.05 level of significance. So there is no significant difference between learning achievement of science and Hindi Achievement test of Girls among Govt. Secondary level students.. So this "**Hypothesis No 2. is Accepted".** Mean difference of achievement is further graphically depicted in fig.2.
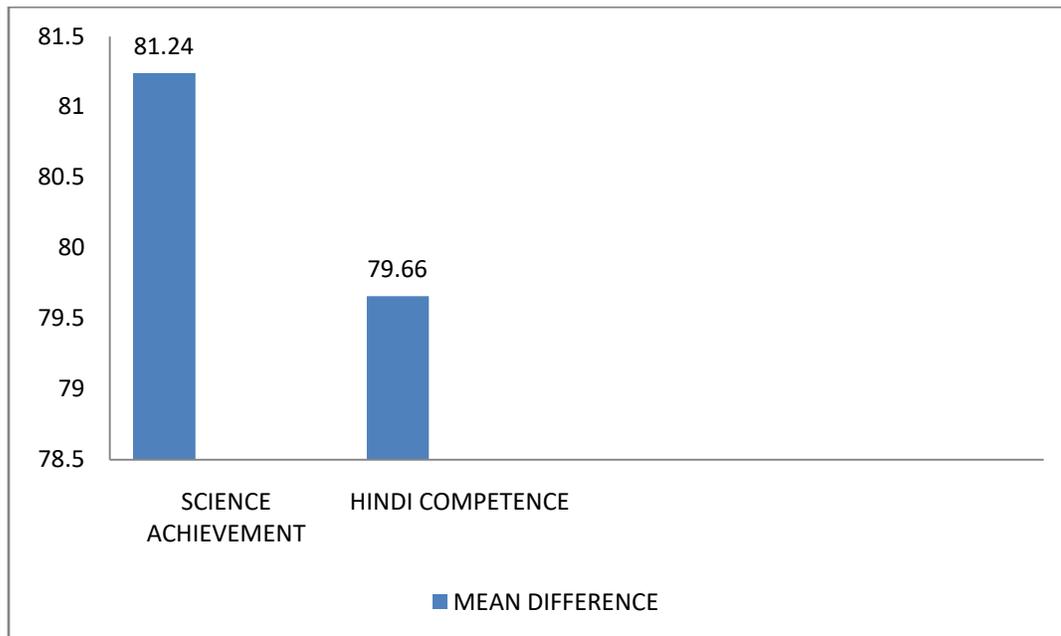


**Figure 2 Mean difference of Science achievement and Hindi language competence of Girls among the Govt. secondary level students**

**Findings of the Study**

- There is significant difference between learning achievement of science and Hindi language competence of Boys among the Govt. secondary level students. This is because that obtained critical ratio value is 3.47 which is more than that of table value for 198 df which is 1.96 at 0.05 level of significance. So hypothesis is rejected. The study found a significant positive correlation between students' proficiency in Hindi and their performance in science. Students with higher levels of language proficiency demonstrated a better understanding of scientific concepts, were able to interpret scientific texts more effectively, and performed better in science-related assessments**.**
- There is no significant difference between learning achievement of science and Hindi language competence of Girls among the Govt. secondary level students. This is because that obtained critical ratio value is 1.68 which is less than that of table value for 198 df which is 1.96 at 0.05 level of significance. So hypothesis is accepted. The study revealed that girls generally exhibited higher levels of Hindi language proficiency compared to boys. This finding is consistent with research indicating that girls tend to outperform boys in language-based skills.
- For both boys and girls, strong Hindi language skills were found to facilitate better communication of scientific ideas, improved reading comprehension of science texts, and the ability to follow instructions and perform scientific experiments more effectively

**Educational Implications of This Study**

1. The study emphasizes the need for a more integrated approach to teaching science and language. Since language proficiency directly affects comprehension and expression in science, teachers should design lessons that simultaneously address language development and scientific concepts.

2. The students with higher Hindi proficiency perform better in science; educational systems should implement targeted language development programs, particularly for students in government schools who may face limitations in language resources and support. These programs should focus on enhancing reading, writing, speaking, and listening skills in Hindi to ensure students can understand and communicate scientific ideas effectively.

3. The study found that girls generally exhibited higher language proficiency, which in turn contributed to better science achievement. To address gender disparities, it is important to create gender-sensitive teaching strategies that not only leverage the strengths of girls but also support boys in developing their language proficiency.

4. Teachers in government schools need professional development to better understand the relationship between language proficiency and science achievement.

## CONCLUSION

The study on Hindi language proficiency as a predictor of science achievement among boys and girls in government schools highlights the critical role that language skills play in academic success, particularly in science education. The findings confirm that strong Hindi language proficiency significantly contributes to better science performance, as it enables students to understand complex scientific concepts, interpret instructions accurately, and effectively communicate their understanding. The study also revealed notable gender differences, with girls generally exhibiting higher language proficiency, which positively influenced their science achievement. This suggests that gender-sensitive approaches are needed to address the language gap and provide additional support to boys, who may require more targeted interventions to improve their language skills and, by extension, their performance in science. Improving Hindi language proficiency, particularly through integrated language and science instruction, can be a key strategy to enhance science achievement in government schools. By prioritizing language development, educators can help bridge the gap in science performance and foster more equitable educational outcomes for both boys and girls.

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