ISSN 0975-0797

JOURNAL

Journal of Education & Pedagogy

A Peer Reviewed Refereed International Research Journal

*Impact Factor: 5.961

Volume XVI No.2 Dec. 2024

NATIONAL EDUCATIONIST COUNCIL

(A Vision to be Transformed into Reality to Meet out Global Challenges in the Field of Education)

Website: www.nec-india.org

ISSN 0975-0797

JOURNAL OF EDUCATION & PEDAGOGY

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Volume-XVI, No. 2, Dec. 2024
Published Biannually
By National Educationist Council

*SJIF 2022

SUBSCRIPTION FEE

	With in India	**Out Side India/Abroad**
One year	Rs. 1500/-	$ 350

Designed & Type Setting by:
Navneet Commercial College
86, Kapoor Commercial Complex, Tej Garhi, Garh Road, Meerut
Mobile: 9917103388, 9837316888
E-mail: mrt.vinay74@gmail.com

Printed by:
Navneet Printers
Tej Garhi, Garh Road, Meerut, Meerut
08126468275

**All Research Papers/Articles pubished in this journal received through E-mail*

NATIONAL EDUCATIONIST COUNCIL

ISSN 0975-0797

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CONTENTS

FUNDAMENTAL DUTIES OF INDIAN CITIZEN

- 2 To abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem;
- 2 To cherish and follow the noble ideals which inspired our national struggle for freedom;
- 2 To uphold and protect the sovereignty, unity and integrity of India;
- 2 To defend the country and render national service when called upon to do so;
- 2 To promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women;
- 2 To value and preserve the rich heritage of our composite culture;
- 2 To protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures;
- 2 To develop the scientific temper, humanism and the spirit of inquiry and reform;
- 2 To safeguard public property and to abjure violence;
- 2 To strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavor and achievement.

ISSN 0975-0797
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Volume XVI, No.2, Dec.2024, pp. 1-9

Mathematics Phobia in Connection with Attitude towards Mathematics among the Elementary School Students

Suman Sur* & Rajarshi Roy**

ABSTRACT

The objective of the study is to explore the level of mathematics phobia with their attributes and how mathematics phobia has an impact over the above spelt attributes in elementary school level with a sample of group students from Govt. Aided or, Govt. Sponsored schools in the North 24 Parganas district of West Bengal. Cluster sampling followed by stratified random sampling technique was applied to collect data by administering two sets of standardized scales concerning different variables. By nature, the data were quantitative and analyzed through ANOVA and Pearson Correlation. The study reveals that the importance to consider and thereby essential address attitude towards mathematics and parental involvement individually to reduce issues like mathematics phobia among the elementary school students and while interaction between the two factors may not play a crucial role. The study revealed that it is essential to consider and thereby address the attitude towards mathematics and teaching method independently to mitigate issues like mathematics phobia; on the other hand, as the study observed, its interaction between two factors may not play a crucial role. The study reveals that both 'mathematics phobia' and 'attitude towards mathematics' are important factors and play critical role in studying mathematics among the elementary school students.

Key words: Mathematics phobia, attitude towards mathematics and elementary school students

Introduction

Mathematics is a vital discipline that significantly contributes in the development of cognitive, affective and psychomotor abilities among the students in school education. Learners consider wrongly mathematics as un-artistic and non-aesthetic. But for a true learner of mathematics, the subject is all beauty, symmetric, balance, harmony, art and music. There is a great pleasure in successfully solving in mathematical problem. Apart from these, giving pleasure through its application to various arts, it also provides entertainment through its own games and puzzles. Students

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play with its numbers, figures, problems, shapes, etc.

Phobia can be defined as a type of anxiety disorder or a mental illness that makes someone very worried about an event issue that affects their life. It involves an extreme fear of something or irrational fear of a specific situation, activity and object or that leads to compelling desire to avoid it (American Psychiatric Association, 2013). The term 'phobia' according to Arem is preoccupied from the Greek word 'phobos' meaning fear, panic-fear, or terror. In the simple terms, the meaning of phobia is 'fear'. Trujillo & Hadfield (1999) have defined mathematics-phobia as the level of discomfort that occurs among students in response to situation involving mathematic tasks which is seen as a threat to their self ability.

According to Lin and Huang (2014), attitude towards mathematics can be referred to as positive, negative, and neutral feelings and dispositions. Some learners find mathematics enjoyable and rewarding while others may feel anxious and disinterested in mathematics.

Mathematics phobia possesses a significant challenge for teachers, teacher-educators and parents. It is crucial for educators to identify the underlying causes of phobia to foster students' interest in learning mathematics. The research paper explores various aspects of mathematics phobia in connection with attitude towards mathematics among the elementary school students.

Rationale of the study

It is worth noting to mention from the forgoing discussion that the area is worthy of research that might deals with students' attitude towards mathematics and the impact on mathematics phobia on their mathematics learning through academic performance concerning gender of the students and location of school of the North 24 Parganas district of West Bengal. It is also essential to focus on its historical background and the present scenarios through several qualitative studies as well as several quantitative works related to the area of investigation.

Review of related research literature

Prior to initiate the study, the authors carried out a detailed review on the related studies conducted in India and abroad over attitude towards mathematics and its effect on mathematics phobia among the school students, some of which are presented for a clear theoretical understanding of the area of research and will also justify the present research.

Studies related to Mathematics-phobia

Kaur, G. (2017) conducted a study on 'Math-Phobia: Causes and Remedies' examined the causes and remedies of poor mathematics teaching and learning in primary and post primary schools and suggested measures to overcome them. The causes of mathematics-phobia were the introduction of modern mathematics, poor system of examination, poor mathematical background, and lack of effective teaching aids, fear of test/ examinations the Universal Primary Education Scheme, maximum number of formula, unqualified teachers, lack of teachers' training program, lack of proper incentives for mathematics teachers, and an inherent fear of mathematics. The finding revealed that

mathematics-phobia exists among students, which is characterized by feverish feelings in mathematics classroom, difficulty in understanding mathematics problem among students. Major causes include poor student-teacher relationship, nonconductive environment for mathematics class.

Studies related to Attitude towards Mathematics

Kumar, M. (2021) conducted a study on 'Achievement in mathematics in relation to attitude towards mathematics, metacognition, and learning styles of IXth grade pupils in the district of Kapurthala (Punjab)'. The results were i) 304 (50.7%) students were having unfavourable attitude towards mathematics whereas 296 (49.3%) students were having a favourable attitude towards mathematics. ii) 187 (55.2%) boys were having unfavourable attitude towards mathematics whereas 152 (44.8%) boys were having a favourable attitude towards mathematics. iii) 144 (55.2%) girls were having a favourable attitude towards mathematics whereas 117 (44.8%) girls were having unfavourable attitude towards mathematics.

Studies related to Mathematics Anxiety and Attitude towards Mathematics

Mutegi, C. M., Gitonga, C. M. & Rvgano, P. (2021) evaluated the relation between mathematics anxiety, attitude and performance. The sample for the study was selected from 55 secondary schools and 367 students were selected from these schools. The study followed correlation research design. To collect the responses Mathematics Anxiety Scale and Attitude towards Mathematics Scale were used. To measure the performance the students' grade list from teachers were obtained. To analyze the data, scattered diagram and Spearman's correlation coefficient were employed. The study found that there was a significant positive correlation between mathematics anxiety and attitude towards mathematics, whereas there was a significant negative linear relation between mathematics anxiety and mathematics performance. It was also found that attitude towards mathematics was correlated with mathematics anxiety which in turn correlated with performance of mathematics.

Defining key attributes

The key attributes, on which the present study hinging-on, are as follows:

Mathematics-phobia

Ashcraft (2002) defines mathematics phobia as a fear of mathematics which may result in weakness in mathematics. Mathematics phobia is a felling of tension, apprehension or fear that interferes with mathematics performance.

In the present study, mathematics phobia refers to the uneasiness, apprehension and fear, the students feel while doing and studying mathematics. In this study it is measured by the total score obtained by the students on mathematics phobia scale.

Attitude towards Mathematics

An attitude can be as positive or negative based on people's evaluation, perception and activities; it could be concrete, abstract; attitude can be seen as more or less positive; attitude towards mathematics is one's own view and opinion; a positive attitude towards mathematics is reflects a positive emotional disposition in relation to the subject, similarly negative attitude is towards mathematics relates to a negative emotional disposition (Zan & Martino, 2007).

In the present study, attitude towards mathematics is either positive or negative responses of learners, in terms of importance, difficulty and enjoyment when learning mathematics. In mathematics, attitude towards mathematics is the process to overcome from mathematics phobia.

School Students

In present study, school students refers to the students of academic institutions having a Class grade VIII in the schools affiliated to West Bengal Board of Secondary Education (WBBSE or, WBCHSE) during the academic session 2023-'24.

Objectives of the study:

The objectives of the present study are as follows:

i. To find out the mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to parental involvement.

ii. To find out the mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to teaching method.

iii. To study the relationship between mathematics phobia and attitude towards mathematics among the elementary school students.

Methodology of the study

The study was conducted following a descriptive survey method.

Sample

The sample for the present study was drawn from a group of students studying in VIIIth standard of Bengali medium schools, which are either financially controlled or aided by the Government of West Bengal. Firstly, cluster sampling technique was adopted to draw the sample in terms of clusters like location of the schools, viz., Rural, Urban, and Schools with management structure, i.e., Government Aided or, Government Sponsored. Stratified random sampling technique was further implied to draw the sample from the clusters and stratification was done in terms of strata like age and gender (male and female) of the students.

Tools

To explore the mathematics phobia among the school students in connection with attitude towards mathematics, two sets of standardized scales were used. The mathematics phobia scale for elementary school learners (MPSESL) was developed and standardized by the authors and was used to collect data pertaining to mathematics phobia of the sample. On the other hand, attitude towards mathematics for elementary school learners (ATMESL) was developed and standardized by the authors and was used to collect data pertaining to attitude towards mathematics of the sample.

MPSESL: To measure the level of mathematics phobia of the sample respondents of the study, validated and standardized MPSESL scale was administered. The Scale was developed in statement pattern including 32 items with a scale range from 32 to 96 and a midpoint is 64. This scale is three point Likert Scale. Each of the items was scored as Often-3, Sometimes-2, and Never-1, developed by the authors. The reliability coefficient of the scale was found to be 0.823.

ATMESL: To measure attitude towards

mathematics of the sample respondents of the study, validated and standardized ATMESL scale was administered. The Scale was developed in statement pattern including 28 items with a scale range from 28 to 84 and a midpoint is 56. This scale is three point Likert Scale. Each of the items was scored as Often-3, Sometimes-2, and Never-1, developed by the authors. The reliability coefficient of the scale was found to be 0.82.

Data: Data for the present study were collected from the respondents by administering the scales. By nature, collected data were quantitative; and were analyzed through ANOVA and Pearson Correlations.

Findings

Findings of the study are presented as follows:

1. The very first objective of the present study was to find out the mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to parental involvement. To reach this objective, inferential statistics with respect to major and categorical variable was computed. The result of the same is presented below:

Table-1: Analysis over comparison of mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to parental involvement

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	P-Value
Main Effect (Attitude towards Mathematics)	250.00	3	83.33	6.00	0.001
Main Effect (Parental Involvement)	100.00	2	50.00	4.50	0.010
Interaction (Attitude towards Mathematics × Parental Involvement)	20.00	6	3.33	0.40	0.920
Within Groups (Error)	450.00	90	5.00		
Total	**820.00**	**101**			

The ANOVA table presented examines the significant difference in mathematics phobia in connection with attitude towards mathematics at elementary school level in relation to parental involvement. It assesses the main effects of attitude towards mathematics and parental involvement. For attitude towards mathematics, the sum of squares for the main effect of attitude towards mathematics is 250, indicating the variance attributable to differences in attitudes, at df 3, the mean square is calculated as 83.33. The F-value is 6, which is statistically significant at $p = 0.001$ ($p < 0.05$). It is indicating that the difference in attitudes towards mathematics is significantly posse impact over mathematics phobia.

For effect parental involvement, the sum

of squares for parental involvement is 100, representing the variance due to parental involvement, at df 2, the mean square is 50. The F-value is 4.50, with a level of significance of $p = 0.010$ ($p < 0.05$). It showing that parental involvement independently contributes to variations in the data.

For the interaction between attitude towards mathematics and parental involvement, the interaction effect has a sum of squares of 20, reflecting the combined variance due to the interaction between attitude towards mathematics and parental involvement, at df 6, the mean square is 3.33, and the F-value is 0.40.The p-value is 0.920, which is not statistically significant ($p > 0.05$). Therefore, it is indicating there is no meaningful interaction between attitude towards mathematics and parental involvement among the elementary school students.

The results indicate that the main effect of attitude towards mathematics is statistically significant ($p = 0.001$), suggesting that differences in attitudes towards mathematics significantly impact the dependent variable. The main effect of parental involvement is also significant ($p = 0.010$), indicating that parental involvement independently contributes to variations in the dependent variable. However, the interaction effect between attitude towards mathematics and parental involvement is not significant ($p = 0.920$), implying that their combined influence does not have a substantial impact on the dependent variable.

2. The second objective of the present study was to find out the mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to teaching method. To fulfill the above objective the inferential statistics with respect to major and categorical variable was computed. The result thereof is given below:

Table-2: Analysis over comparison of mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to teaching method

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	P-Value
Main Effect (Attitude towards Mathematics)	200.00	3	66.67	5.50	0.005
Main Effect (Teaching Method)	120.00	2	60.00	4.50	0.008
Interaction (Attitude towards Mathematics × Teaching Method)	40.00	6	6.67	0.50	0.810
Within Groups (Error)	480.00	90	5.33		
Total	**840.00**	**101**			

The ANOVA table presented examines the significant difference in mathematics phobia in connection with attitude towards mathematics among the elementary school students in relation to teaching method. It assesses the main effects of attitude towards mathematics and teaching method. For attitude towards mathematics, the sum of squares for

the main effect is 200, indicating the variance attributable to differences in attitudes, at df 3, the mean square is calculated as 66.67.The F-value is 5.50, which is statistically significant at $p = 0.005$ ($p < 0.05$). It indicates that the difference in attitudes towards mathematics is significantly posse impact over mathematics phobia.

For effect of teaching method, the sum of squares for teaching method is 120, representing the variance due to teaching method, at df 2, the mean square is 60.The F-value is 4.50, with a level of significance of $p = 0.008$ ($p < 0.05$). It showing that teaching method independently contributes to variations in the data.

For the interaction between attitude towards mathematics and teaching method, the interaction effect has a sum of squares of 40, reflecting the combined variance due to the interaction between attitude towards mathematics and teaching method, at df 6, the mean square is 6.67, and the F-value is 0.50.The p-value is 0.810, which is not statistically significant ($p > 0.05$). Therefore, it is indicating there is no meaningful interaction between attitude towards mathematics and teaching method for elementary school learners.

The results indicate that the main effect of attitude towards mathematics is statistically significant ($p = 0.005$), suggesting that differences in attitudes towards mathematics significantly impact the dependent variable. The main effect of teaching method is also significant ($p = 0.008$), indicating that the teaching method independently contributes to variations in the dependent variable. However, the interaction effect between attitude towards mathematics and teaching method is not significant ($p = 0.810$), implying that their combined influence does not have a substantial impact on the dependent variable.

3. The third objective of the study was to explore the relationship between mathematics phobia and attitude towards mathematics among the elementary school students. To attain this objective, the inferential statistics with respect to major variables was computed. The result of the same is given follows:

Table-3: Analysis over relationship of mathematics phobia and attitude towards mathematics among the elementary school students

Correlations			
		Attitude towards Mathematics	**Mathematics Phobia**
Attitude towards Mathematics	**Pearson Correlation**	1	**.024**
	Sig. (2-tailed)		.576
	N	541	541
Mathematics Phobia	**Pearson Correlation**	**.024**	1
	Sig. (2-tailed)	.576	
	N	541	541

Table 3 shows that, Pearson correlation coefficient (r) between mathematics phobia and attitude towards mathematics among the elementary school students is 0.024. This indicates a very low and positive relationship between these two variables. As per concerned with the association between attitude towards mathematics and mathematics phobia among the elementary school students, the findings indicate that the estimated p value, 0.576, is greater than 0.05 (5% level of significance), implying that the null hypothesis is accepted. So, based on the evidence, it appears that a relationship between attitude towards mathematics and mathematics phobia does not exist or persist. Following graph (see Figure 1) also satisfy the relationship between these two variables clearly.

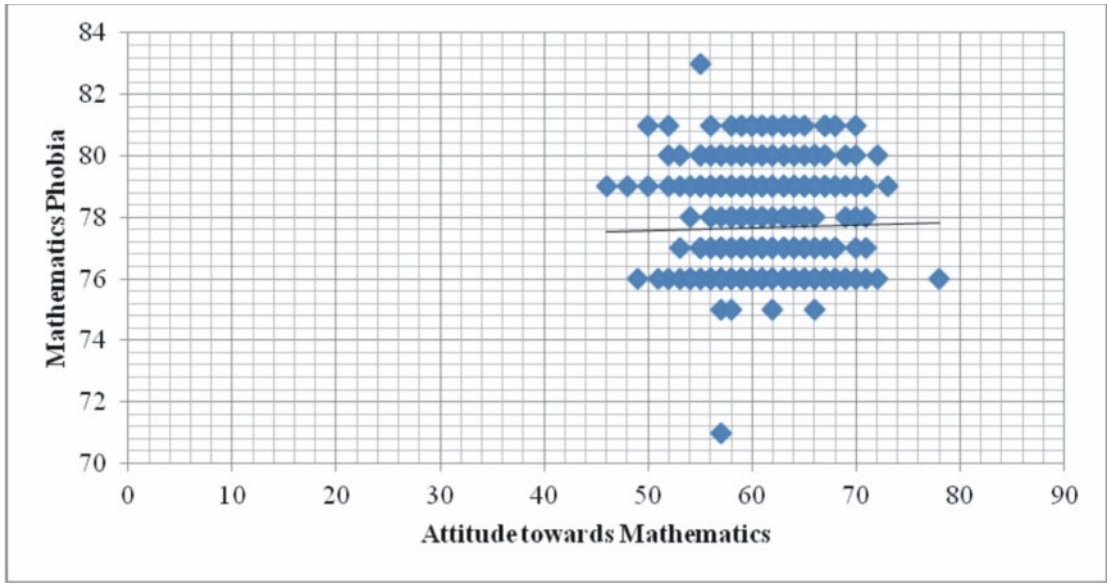

Figure 1: Scatter plot sows the correlation between mathematics phobia & attitude towards mathematics among the elementary school students

Discussion and Conclusion

The first objective of the study was framed to explore the level of mathematics phobia in connection with attitude towards mathematics in relation to parental involvement among the respondent group. The study revealed that it is important to consider and thereby essential to address the 'attitude towards mathematics' and parental involvement independently to reduce issues like mathematics phobia among the elementary school students, while interaction between these two factors may not play a crucial role.

The second objective was framed to explore the level of mathematics phobia in connection with attitude towards mathematics in relation to teaching method. The study revealed that it is essential to consider and thereby to address the attitude towards mathematics and teaching method independently to mitigate the issues like mathematics phobia; on the other hand, as the study observed, the teaching method and its interaction with 'attitude towards mathematics' may not play a crucial role.

The third objective aimed to explore the

relationship between mathematics phobia and attitude towards mathematics among the elementary school students. The study revealed that the attitude towards mathematics has no significant relationship with the mathematics phobia.

The study makes a clear picture about the present scenario of understanding mathematics phobia, which is essential to address for better and effective learning of mathematics. By identifying its causes and implementing targeted strategies, teacher-educators, parents, and institutions may help students to overcome their fear, develop self confidence, and appreciate the relevance of mathematics in daily life. Attitude towards mathematics can also be helpful for better performance and achievement in mathematics and developing an assortment of mathematical skills.

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ISSN 0975-0797
Journal of Education & Pedagogy
(A Peer Reviewed/Refereed International Research Journal)
Volume XVI, No.2, Dec.2024, pp. 10-20

Increasing Proficiency in English Vocabulary of Secondary School Students through Mind Mapping Technique

Gagandeep Kaur* & Gurwinder Veer Kaur**

ABSTRACT

This present study examines the effectiveness of mind mapping technique on achievement in English vocabulary of secondary school students in relation to creative thinking. The study was initiated on the students of class IX of English medium schools of Amritsar District affiliated to Central Board of Secondary Education, New Delhi. For the purpose of present investigation a pre and post-test factorial design was employed. An achievement test on selected topics in English vocabulary was developed by the investigators which was used as pre-test as well as post-test. Verbal test of creative thinking (Mehndi 2009) was used andInstructional material for mind mapping technique and conventional teaching strategy on selected topics was prepared. By comparing the effects of mind mapping technique with those of conventional teaching, the study found that the students taught through mind mapping technique displayed better results than those who were taught by conventional teaching strategy. Further, the results revealed that achievement of high creative thinking group was higher than that of average and low creative thinking groups.
Key words: Mind Mapping Technique, Achievement in English Vocabulary, Secondary School Students, Creative Thinking

Introduction

English is an international language that is very important to study because it is used in the world of communication. People know it as a foreign language and also as a second language. Usually, students in India begin to know English since kindergarten until senior high school. It is a long time to study English. In contrary, most of students still consider that English is a difficult subject, especially in vocabulary mastery. Vocabulary is essential in the process of learning English. There is no language without vocabulary. That is why it is one of the most important elements of language. The mastery of vocabulary helps the learner to understand the reading materials; understand the spoken language, give responses, listen and write materials. In other words, students can communicate fluently.

Mukoroli (2011) defined, "Vocabulary as

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the entire stock of words belonging to a branch of knowledge or known by an individual." Having good mastery of vocabulary, contributes significantly to the achievement of the subjects in the class. Teaching English vocabulary is challenging, especially for young students because English words are sometime new for them. Dellar and Hocking (in Thornbury, 2002) say, "If you spend most of your time studying grammar, your English will not improve very much. You will see most improvement if you learn more words and expressions. You can say very little with grammar, but you can say almost anything with words."Thornbury (2002) further adds, "The learner needs not only to learn a lot of words, but to remember them." According to Conni (2012) cited in Laufer (1997, cited in Akbari, 2008), "Vocabulary learning is at the heart of language learning and language use".

Words are signs or symbols for ideas. They are means by which people exchange their thoughts. The words we learn, the more ideas we should have. So we can communicate the ideas more effectively. Harmer (1991) also states that an ability to manipulate grammatical structure does not have any potential for expressing meaning unless words are used. Rivers in Nunan (1991) has argued that the acquisition of an adequate vocabulary is essential for successful second language learners because without an extensive vocabulary, they will be unable to use the structures and functions they may have learned for comprehensible communication. Vocabulary is one of the most important aspects in mastering English because the ability of the students to read or comprehend the subject is relatively determined by their vocabulary. National Focus Group Position Paper of (NCERT, 2006), "Lexical knowledge is now acknowledged to be central to communicative competence and the acquisition and development of a second language. Even in a first language, ". . . whereas the grammar of a language is largely in place by the time a child is 10 years old . . . , vocabulary continues to be learned throughout one's lifetime" (Schmitt 2000)." In this case, we must emphasize that vocabulary plays a key role not only in reading but also in speaking, writing, and listening.

To master all the language skills, vocabulary knowledge is important that has to be known by the students and the teachers of English should have a technique that makes the students interested in learning vocabulary. There are many techniques of making the students interested in what they are learning especially in learning vocabulary.According to Brown (1994), "Techniques are the specific activities manifested in the classroom that are consistent with a method and therefore in harmony with an approach as well."

Memory sensory has important value in learning vocabulary. The students need balancing in usage of the left brain and right brain. Whole brain is needed by the students to think perfectly. Right brain is for creativity and visualization. Left brain is for logical and rational. Mind mapping combines both and become whole-brained. It stimulates the brain by appealing to both the creative and logical side of the brain.According to De Potter and Hernacki as translated into English (in Abdurrahman, 2008), "Mind mapping uses visuals reminder and sensory into a pattern from the ideas which are related". Mind mapping allows the students to clarify their thoughts by categorizing and grouping into related ideas.

Within the area of English Foreign Language, mind mapping has been effective as a pedagogical technique for the improvement of writing and speaking skills (Fiktorius, 2013; O 'Reilly, 2015). Wahyudi (2008) in an experimental study proved the effectiveness of mind mapping technique in improving students' writing in narrative text. The results showed that mind mapping stimulated the students and significantly improved their ability in writing narrative text. Samhudil (2015) revealed that mind mapping technique improved students' vocabulary mastery. Aziz and Yamat (2016)conducted a study and revealed that the intervention programme of using mind-mapping to improve students' ability in increasing students' vocabulary list and get the better band mark for that section has a tremendous positive impact on the samples as compared to chalk and talk method. Further, Nodoushan and Maibodi (2017) revealed that the long term effect of the mind mapping strategy was significantly effective in the improvement of vocabulary used in writing tasks of EFL learners participating in the experimental group. Wang and Dostal (2018) also examined the effect of using mind map on learning English vocabulary and revealed that the mind map helped students create interconnections among isolated units or items thereby helping them organize and manage knowledge learned. This claim is also supported by Prabha and Aziz (2020)who concluded that using the features of Poly Category Mind Map, which are the pictures, keywords, and grouping of words aided the students in learning vocabulary.

Hadley (2003) emphasizes the importance of creative effect in second or foreign language learning and the use of language creatively. He believes that learners must learn to use language creatively to progress beyond the elementary phases.Carter (2004) argued, "Discussions of creativity in relation to language teaching and learning have been extensive and continue to be a very major point of application of a wide range of theories of creativity" (p. 213). Therefore, it seems to be quite reasonable to state that the TEFL/ TESOL (Teaching English to Speakers of Other Languages) practice can be highly influenced by creativity (Fahim & Zaker, 2014). Seddigh and Shokrpour (2013) observed significant correlation between creativity and the overall Vocabulary Learning Strategies use of the participants.

The students who have little knowledge of vocabulary face difficulties to understand the written language and oral language. In teaching and learning English especially vocabulary, the teacher should take the best approach, method, technique or strategy to make students interested in teaching and learning process in order to solve the problems that students faced. National Focus Group Position Paper of (NCERT, 2006),"Research has also shown us that greater gains accrue when language instruction moves away from the traditional approach of learning definitions of words (the dictionary approach) to an enriched approach, which encourages associations with other words and contexts (the encyclopaedia approach) (Fawcett and Nicolson 1991; Snow 1991)". In this case, the research uses Mind Mapping technique in teaching vocabulary. Buzun (2002) "It helps in learning through associations and connections". According to Tsinakos and Balafoutis (2009), "Mind Mapping is an important technique that improves the way you takes notes, and enhances your creative problem solving. By using Mind Maps, you can quickly identify and understand the structure of a subject and the way that pieces of

information fit together, as well as recording the raw facts contained in normal notes." Based on the statement it can be concluded that this technique is important to increase vocabulary mastery.Finally, based on the overall discussion that is presented in this background the investigators intended to conduct a study to assess "Effectiveness of Mind Mapping Technique on Achievement in English Vocabulary of Secondary School Students in Relation to Creative Thinking."

Objectives of the Study

The following objectives were framed for the study

1. To develop lessons based on mind mapping technique for selected topics of English.
2. To develop lessons based on conventional method of teaching for selected topics of English.
3. To develop achievement test for selected topics of English vocabulary.
4. To compare the mean gain scores of achievement in English vocabulary of groups taught through mind mapping technique and conventional method.
5. To compare the achievement of students in English vocabulary with respect to creative thinking.
6. To study the interaction effect of instructional strategy and creative thinking on achievement in English vocabulary.

Hypotheses of the Study

Based on the problem and objective of the study, the following hypotheses are formulated to achieve the objectives of the study:

Ho1 The mean gain scores of achievement in English vocabulary of groups taught through mind mapping technique will be significantly higher than that of group taught through conventional method.

Ho2 There will be no significant difference in the mean gain scores of achievement in English vocabulary with respect to creative thinking.

Ho3 There will be no significant interaction effect of mind mapping technique and creative thinking on achievement in English vocabulary

Methodology

The following methodology were used:

Sample: The present study was initiated on the students of class IX of English medium schools of Amritsar District affiliated to Central Board of Secondary Education, New Delhi. Out of total schools of Amritsar district, four schools were drawn randomly from which a sample of 400 students was taken randomly. The study was conducted on two intact groups viz. one was experimental group and other was control group in each school.

Design: For the purpose of present investigation a pre and post-test factorial design was employed. In order to analyze the data, mean, SD, analysis of variance (2×3) and t-ratio were used for the two independent variables viz. instructional treatment and creative thinking levels. The impact of teaching model was examined at two levels, namely mind mapping technique and conventional teaching strategy. The classification of creative thinking group was done at three levels viz. high, average and low creative thinking. The main dependent variable was the gain scores of achievement test , which was calculated as

the difference in post- test and pre-test scores.

Tools used: The following tools were used for the collection of data:

1. An achievement test on selected words or topics in English vocabulary developed by the investigators used as pre-test as well as post-test.
2. Verbal test of creative thinking (Mehndi 2009) was used.
3. Instructional material for mind mapping technique and conventional teaching strategy on selected topics such as The Bond of Love, Kathmandu, and If I Were You from the prescribed syllabus of class IX.was prepared by the investigators.

Procedure

The experiment was conducted in five phases. Firstly, students were randomly assigned to control and experimental group. Secondly, the test of creative thinking was administrated in each school, in order to identify creative thinking levels of the students. Thirdly, a pre-test was administered to the students of experimental and control groups. The answer-sheets were scored to obtain information regarding the previous knowledge of the students. Fourthly, one group was taught through mind mapping technique and the control group was taught through conventional teaching strategy by the investigators. The experimental treatment was confined to about 15 working days of academic session. Fifthly, after the completion of the experiment, the post- test was administered to the students of both the groups. The answer-sheets were scored with the help of scoring key.

Analysis of Descriptive Statistics

The gain scores of students falling into two groups were subjected to descriptive statistics to analyses the effect of subjecting the groups to different instructional treatments on the achievement in English vocabulary. The mean and standard deviation were calculated. The result has been given in table 1.

Table-1: A summary of descriptive statistics of mean and SD of gain achievement scores of experimental and control group

Methods	Levels of Creative thinking	N	Mean	Std. Deviation
Mind mapping technique (Experimental group)	High	29	25.07	4.358
	Average	76	22.45	4.559
	Low	32	21.41	3.618
	Total	137	22.76	4.470
Conventional strategy (Control Group)	High	28	20.00	4.447
	Average	80	19.19	5.146
	Low	30	14.47	6.673
	Total	138	18.33	5.733
Total	High	57	22.58	5.057
	Average	156	20.78	5.121
	Low	62	18.05	6.328
	Total	**275**	**20.53**	**5.593**

Analysis of Variance on Gain Achievement Scores

The mean of different sub groups, Sum of Square, degree of freedom, mean sum of squares and F- ratio have been presented in table 2.

Table 2: Summary of analysis of variance (2x3) factorial design

Dependent Variables	Source of Variation	Sum of Squares	df	Mean Squares	F-ratio	Sig.
Achievement in English Vocabulary	Instructional Strategy (A)	1453.048	1	1453.048	60.940**	0.01
	Creative Thinking (B)	658.430	2	329.215	13.807**	0.01
	AXB	156.617	2	78.308	3.284**	0.01
	Error Term	6414.024	269	23.844		

**Significant at 0.01 level
(Critical value 3.89 at 0.05 and 6.76 at 0.01 level, df 1/269)
(Critical value 3.05 at 0.05 and 4.71 at 0.01 level, df 2/269)

Instructional Strategy (A)

It is seen from the table 2 that the F-ratio for difference between the mean gains scores for mind mapping technique and conventional teaching strategy was 60.940 which in comparison to the table value was found to be significant at 0.01 level of significance. It may thus be concluded that the use of different instructional strategies to impart instructions in English vocabulary attributed to development of differences in mean gain achievement scores in English. The result indicates that the achievement in English of group taught through mind mapping technique is much higher than that of conventional strategy.

Creative thinking (B)

It may be seen from the table 2 that the F-ratio for difference between the mean gains scores for High, Average and Low creative thinking groups was 13.807, which in comparison to the t-value was found to be significant at 0.01 level of significance. It may be, therefore, concluded that high, average and low creative thinking groups were different on achievement in English vocabulary.

To probe deeper, F-ratio was followed by t-test. The value of t-ratio for difference in gain scores of high, average and low creative thinking groups have been placed in table 3.

Table 3: t-ratio for different combinations of different creative thinking groups

Variables	High Creative thinking			Average Creative thinking			Low Creative thinking		
	N	M	SD	N	M	SD	N	M	SD
	57	22.58	5.057	156	20.78	5.121	62	18.05	6.328
High Creative thinking	-			2.283**			4.290**		
Average Creative thinking	-			-			3.309**		
Low Creative thinking	-			-			-		

** Significant at 0.01 level
(Critical Value 1.98 at 0.05 and 2.625 at 0.01 levels, df 117)
(Critical Value 1.97 at 0.05 and 2.60 at 0.01 level, df 211

It may be inferred from the table 3 that high and average creative thinking groups, high, low creative thinking group and average and low creative thinking groups were significantly different with respect to gain scores.

Interaction between Instructional Strategies and Creative thinking (AxB)

It may be seen from the table 2 that F-ratio for interaction between instructional strategies and creative thinking was 3.284, which in comparison to the table value was found to be significant at 0.01 level of significance. This suggested that interaction effect on achievement in English vocabulary was signified at the specified level The result indicates that there was a significant difference in the gain scores on achievement in English vocabulary due to interaction effect of mind mapping technique and creative thinking.

To ascertain significance of difference among means of various combination groups, t-ratios were computed, which have been placed in the following table 4.

Table 4: t-ratio for difference in mean gain achievement scores of instructional strategies and different levels of creative thinking

Variables		Experimental Group						Control Group					
		C1		C2		C3		C1		C2		C3	
		N	M	N	M	N	M	N	M	N	M	N	M
		29	25.07	76	22.45	32	21.41	28	20.00	80	19.19	30	14.47
Experimental Group (Mind mapping technique)	High Creative thinking	-		2.666**		3.584**		4.346**		5.479**		7.198**	
	Average Creative thinking	-		-		1.148		2.444**		4.180**		7.070**	
	Low Creative thinking	-		-		-		1.350		2.226**		5.134**	
Control Group (Conventional Strategy)	High Creative thinking	-		-		-		-		.743		3.688**	
	Average Creative thinking	-		-		-		-		-		3.940**	
	Low Creative thinking	-		-		-		-		-		-	

** Significant at 0.01 level, * Significant at 0.05 level.

(Critical Value 1.98 at 0.05 and 2.63 at 0.01 levels, df 102, 103, 104, 106, 108 and110)

(Critical Value 2.00 at 0.05 and 2.66 at 0.01 levels, df 55, 56, 57, 58 59 and 60)

Here C1 stands for high creative thinking, C2 for Average creative thinking and C3 for low creative thinking.

Table 4 indicates that the high creative thinking group of experimental group exhibited higher mean gain scores than average and low creative thinking group of experimental group.

Further, it is revealed that the high creative thinking group of experimental group exhibited higher mean gain scores than high, average and low creative thinking group of control group. The average creative thinking group of experimental group exhibited higher mean gain scores than high, average and low creative thinking group of control group. The low creative thinking group of experimental group exhibited higher mean gain scores than average and low creative thinking group of control group. The high creative thinking group of control group exhibited higher mean gain scores than average and low creative thinking group of control group

Discussion of Results

From the above interpretation of results, it was found that the mean gain score of experimental group was significantly higher than that of control group and significant difference existed between the mean gain scores of experimental and control group. It means that students taught through mind mapping technique M = (22.76) approach show better performance than the students

taught through conventional strategy M = (18.33). The above result is consistent with the result of the studies conducted by Pua, Li, Lui & Cheng (2015) and Samhudi (2015) which indicated that mind mapping technique has a positive effect on the English vocabulary achievement of students. Alahmadi (2020) also concluded that mind mapping facilitates vocabulary learning by increasing the knowledge and the acquisition of the meanings of the vocabulary words used. It also helped with the vocabulary learning process by increasing the level of the motivation of Saudi students in learning new words.

Further, the mean gain scores of high creative thinking group were higher than that of average and low critical thinking groups. The above result is consistent with the result of the study conducted by Buzan (1993) which indicated that creative thinking has a positive effect on the English vocabulary achievement of students.

The result indicates that there was a significant difference in the mean gain scores on achievement in English vocabulary due to interaction effect of mind mapping technique and creative thinking. It can be thus concluded that when instructions were imparted through mind mapping technique higher gain scores were exhibited by High, Average as well as Low creative thinking group in comparison to conventional method of teaching. The above result is consistent with the result of the study conducted by Buzan (1993) which indicated that there is a significant interaction effect of mind mapping technique and creative thinking on achievement in English vocabulary of the students.

Conclusion

The results suggest that students should be taught English vocabulary through mind mapping technique as it is found that the performance of students taught through mind mapping technique is higher than that of conventional strategy group on achievement in English Vocabulary. Students with high and average creative thinking skills have shown more inclination towards mind mapping technique. English teachers should ensure equal opportunities to all levels of creative thinking students viz. High, average and low to explore their creative ideas. Students should be encouraged to use their creative thinking as well as logical thinking. Creative environment should be ensured in the class during teaching. High creative thinking students should be encouraged and supported by the teacher to explore their creative ideas and logical thinking as well. Average and low creative thinking group should be facilitated and proper attention should be given by the English teacher to explore their creativity.

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ISSN 0975-0797
Journal of Education & Pedagogy
(A Peer Reviewed/Refereed International Research Journal)
Volume XVI, No.2, Dec.2024, pp. 21-29

An Assessment of Outcome-Based Instruction in Social Science Education at High School Level

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ABSTRACT

Social Science is essential for developing research-inquiry, critical thinking, problem-solving, and decision-making skills; and assists students in becoming better citizens by providing relevant information and knowledge, skills, and attitudes. Outcome-Based Education (OBE) helps prepare them to increase their competitiveness by combining hyper-specialized knowledge with dynamic and cross-sectional capabilities. It emphasizes the importance of identifying aptitude, interests, and field of study, as well as cognitive competence. Social science education requires a more sophisticated approach. The study aimed to assess the present system of evaluation of actuality in social science education at high school level and evaluate the effectiveness of outcome based instruction in social science at high school level. It was conducted among 489 high school students from Cherthala sub-district. Outcome-based education is needed to improve skill development and language skills among the social science learners.

Key words: Social Science, Outcome Based Education, Student-Centered

Introduction

In a world that is becoming more globalised, political, economic, and social developments have an impact on societies; to respond, societies need contemporary education-instruction models. As a result, it significantly affects how social science is taught and learned, calling for new methods, fixes, and regulations. Social science curricula are being developed globally with a significant focus on understanding the current situation and future positions in order to prepare the next generation of citizens in a well-balanced way. Therefore, it is crucial for social science students to develop research-inquiry, critical thinking, problem-solving, and decision-making skills in everyday life as well as to keep up with current events in order to learn about past and present events. The social sciences must take on this duty because they are the scientific study of human society and social interactions and they are concerned with how people develop and behave as well as the resources they use and the various institutions they need to function and live their lives. To live up to these expectations and realize the learners' skills and abilities (comprehension, application, analysis, evaluation, synthesis, and creativity), social science teaching and learning should be

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sufficiently thorough. In the context of modern educational systems, this is where the value of outcome-based education is found. Outcome-Based Education (OBE), which combines highly specialized knowledge with adaptable and cross-sectional skills, aids students in becoming more competitive.

Social Science Education; Yesterday and Today

In order to create an interdisciplinary option, the social science curriculum in Indian schools combines knowledge from pertinent social sciences like history, economics, political science, geography, sociology, etc. It teaches students about the social, psychological, and political interactions of people and institutions while using critical thinking skills to spot trends and patterns. Social science education in the past was not based on practices that were supported by science because it relied on conventional teaching and learning techniques. There was a lack of student engagement in the teacher-centered lecture methods, which led to passive listeners, subpar academic performance, an average grade on exams, and blame for the subject as well as a negative attitude among parents and students towards continuing in social science in higher education. The traditional method also makes it difficult for students to learn new material because they are only exposed to lectures and textbooks. Teachers still instruct thirty to forty students in social studies in the same manner as they did fifty years ago, speaking the majority of the time.

According to research and discussions among teacher educators, there have been significant changes in the teaching and learning of social science in India over the past three decades. The academic community understood the importance of social science and mandated its inclusion in school curricula. Academics generally concur that there isn't a single best method of instruction. There are many different methods of instruction, including debates, lectures, dramatizations, field trips, questions and answers, problem-solving dramatizations, home assignments, and building techniques. Books, newspapers, images and charts, maps, models, real object resource centers, audio-visual equipment, chalkboards, and flannel graphs are just a few examples of the resources that need to be well-managed and organized in order to be used effectively. Thanks to the use of cutting-edge information technology and interactive communication technologies, the modern social science learning process is engaging and student-centered. As a result, outcome-based education (OBE), a pedagogy or educational theory that focuses on students in an academic programme, is being implemented in Indian schools. Each student is expected to have mastered the material by the end of a learning session and be capable of realizing a standard of achievement. The OBE pattern of modern education is also being implemented in the social science curriculum.

The Significance of Outcome-Based Education

The pedagogical approach known as outcome-based education (OBE) emphasises learning over teaching. The focus is on what a student can accomplish once they have finished a course or programme. It is focused on the needs of the students, so it gives them the freedom to decide why and how they want to study. For outcome-based learning, a specific framework model must be created and followed; the first step is to identify desired outcomes, design an outcome-based

curriculum, adopt and use the proper teaching-learning pedagogical tools, and design the proper assessment to gauge the learning outcomes' aspiration. A common framework for classifying educational objectives is Bloom's taxonomy. These are frequently used to direct students through various levels of cognitive learning in teaching, learning, and assessment. OBE does, however, have its share of drawbacks, including the issue of interpretation, the difficulty of creating learning objectives, and the difficulty of evaluating assessments. Additionally, OBE will be on the verge of a brand-new era in which students will have to negotiate a world that is constantly shifting. Teachers may transition from their roles as knowledge disseminators to knowledge facilitators.

Outcome-Based Education In Social Science

Both the international community and educationalists are not unfamiliar with the idea of outcome-based education. It may also be referred to as competency-based education, performance- or results-based training, or even need-based education. According to Gardner's theory of multiple intelligences (intelligence is a bio-psychological potential of humans who process specific types of information in particular ways), a person's intellectual ability is greatly influenced by their biological or genetic potential, their brain's cognitive processes, their environment's ability to support those processes, and their own drive to grow. Outcome Based Education (OBE) is uses this potential in educational system that emphasizes the importance of identifying aptitude, interests and the field of study, as well as education based on the cognitive competence of the students.

Each of the desired behavioral changes listed in the "taxonomy table" should be attained through learning the designated content, according to the philosophical and socio-psychological foundations of outcome-based education principles in social science education. Teachers and education experts, however, doubt that the teaching of subjects like social science will be sufficient to realize these behavioral contents. They contend that, in contrast to scientific fields, social science is focused on people and how they interact with their social environments. In actuality, subtle emotional components of human nature cannot be seen in classroom behavior. As a result, social sciences education needs a more sophisticated implementation of outcome-based education. Field-based learning, field work, community service, practicum, project work, internships, and other types of hands-on training that expose students to real-world situations and help them develop their skills must all be included in the curriculum. The teacher needs to be committed to the job in order to complete it in a way that benefits the students.

Objectives of The Study

The objectives of the present enquiry as listed below

1. To assess the present system of evaluation of actuality in social science education at high school level
2. To enquire the present system of outcome based instruction in social science at high school level
3. To evaluate the effectiveness of outcome based instruction in social science at high school level

Methodology

The study is administered among 489 (291 Girls and 198 Boys) high school students selected through stratified random sampling method from Cherthala sub-district of Alappuzha District, Kerala State. The students were belongs to 8th and 9th standards from government aided and government schools of Cherthala. The outcomes of learning, course outcome and unit outcomes are assessed separately. The course outcome is assessed through the year end examination performance of the selected students. The unit outcomes are assessed with the help of a computer based assessment package designed to test the subject competency in social science. Necessary statistical methods were used for the analyses the data.

Results and Discussion

Through the use of stratified random sampling, the sample is chosen. The students' gender is not chosen as a deciding factor and is not given particular attention. Students from various schools in the Cherthala sub-district who are in the eighth and ninth standard are chosen for the study. The effectiveness of outcome-based instruction is evaluated using the inclusive method. The following table includes information about the sample's structure and makeup.

Distribution of Sample

Sl No	Name of the School	Standard and No of Students				Total
		8th Boys	8th Girls	9th Boys	9th Girls	
1	SNGM Boys, Cherthala	12	16	14	20	62
2	Govt. Girls, Cherthala	10	15	12	16	53
3	Govt. HSS, Cherthala South	8	14	10	15	47
4	Govt. HSS, S L Puram	10	16	12	18	56
5	DVHSS Charamangalam	8	15	10	15	48
6	HFHSS Kattoor	12	18	11	16	57
7	HF HSS Muttom	10	15	12	14	51
8	St. France Assisi HSS, Arthunkal	11	15	14	20	60
9	ABVHSS, Muhamma	12	18	10	15	55
Total		**93**	**142**	**105**	**149**	**489**

Selected Course Outcomes Of The Study

Course Outcomes are major domain-specific outcomes that are specific, measurable, and can be demonstrated by students upon course completion. They are written using action verbs. The course outcome, which is a tool for gauging student performance in each course, continues to be the foundation of the hierarchy of outcomes. The course outcome (CO) is determined by how well students perform on both unit assessments and the final exam. The tools used for these assessments are mapped to specific course outcomes (COs) or action verbs in the

bloom's taxonomy and each verb are further mapped to a specific CO. According to OBE, each question on unit tests and year-end exams enables the teacher to assess a specific CO/ Action Verb of student performance; as a result, student performance on each question must be tracked in order to assess the CO attainment. The CO attainment of social science can be evaluated once the grades of each student in each unit and year-end examination metrics are entered. The CO attainment is then determined for each class, so each student's performance on an individual action verb can also be determined to gauge their level of social science competency.

Course Outcomes	Specification (Action)	Represented Questions	
		Unit Test	Year End Exam
CO1	Remember- Events, Time, Names, Place etc	1, 2, 5, 9	2, 7, 9
CO2	Understand- Features, Characteristics etc	3, 4, 6	1, 3, 4
CO3	Identify/Locate- Significance, Location etc	7, 8, 10	5, 6, 8, 10
CO4	Define- Terms, Concepts, Ideology etc	11, 15	11, 12, 13
CO5	Explain	12, 13, 14	14, 15
CO6	Analyze	16,	17
CO7	Compare/Distinguish	17, 18	16, 18, 19
CO8	Create	19, 20	20
CO9	Comprehend	21, 22	21, 22

The same action/specifications are used in unit test also. The unit achievement is evaluated through a computed based assessment (Yaksha Objective Type Multiple Choice Test) in which all the responses of the students are marked in Yes/No, True/False, Agree/Disagree and tick the appropriate response from the alternatives given. The responses were tabulated against the pre-designed unit outcome assessment matrix and evaluated.

Student Responses (Year End Exam)

Participants	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8	CO9	Average
8th STD Boys	72	93	90	50	90	52	47	48	68	**64.44**
8th STD Girls	142	140	142	120	100	120	140	120	90	**123.7**
9th STD Boys	105	100	100	105	100	90	80	90	90	**95.6**
9th STD Girls	149	149	140	146	142	130	140	136	142	**142.67**
Average	**117**	**120.5**	**118**	**105.3**	**108**	**98**	**101.8**	**98.5**	**97.5**	**107.14**

Student Responses (Unit Test)

Participants	UO1	UO2	UO3	UO4	UO5	UO6	UO7	UO8	UO9	Average
8th STD Boys	93	93	92	90	90	93	90	91	90	**91.55**
8th STD Girls	142	142	142	140	142	140	140	138	130	**139.55**
9th STD Boys	105	105	102	105	101	100	100	100	100	**102**
9th STD Girls	149	149	149	146	140	140	145	142	144	**144.88**
Average	**122.5**	**122.5**	**121.25**	**120.25**	**118.25**	**118.25**	**118.75**	**117.75**	**116**	**119.5**

The corresponding tables for the unit test and year-end exam reveal that the majority of students marked correct answers as proof that they had mastered both the unit outcome and the course outcome. In class and group results, the achievement rate of girls is higher than the achievement rate of boys. The average score for each UO and CO, however, demonstrates that there is no appreciable difference in the general achievement rate. However, when compared to the earlier model, which was the pre-outcome based evaluation model, memory testing was the main method of evaluation and other components of thorough evaluation strategies are missing. The present study shows, at the high school level, there is no significant difference in the achievement of boys and girls, 8th and 9th grade students in social science.

Year End Examination- t and p value table

Category	N	Mean	SD	SEM	MD	t -Value	df	p-Value
8th Boys	93	64.44	19.46	2.0179	20.17	23.04	233	0.0001
8th Girls	142	123.7	19.16	1.6079	15.31			
9th Boys	105	95.6	8.45	0.8248	7.16	51.4944	252	0.0001
9th Girls	149	142.67	6.12	0.5014	5.77			
8th STD	235	95.66	14.15	0.9230	11.55	22.7966	487	0.0001
9th STD	254	118.44	6.58	0.4129	5.51			

Unit Test- t and p value table

Category	N	Mean	SD	SEM	MD	t -Value	df	p-Value
8th Boys	93	91.55	2.57	0.266	1.25	105.96	233	0.0001
8th Girls	142	139.55	3.84	0.322	2.46			
9th Boys	105	102	2.35	0.23	2	105.2	252	0.0001
9th Girls	149	144.88	3.68	0.3	3.01			
8th STD	235	115.44	2.32	0.15	1.53	34.17	487	0.0001
9th STD	254	123.44	2.81	0.17	2.47			

Assessment Table

Test	Mean	SD	t-Value	p-Value
Unit Test	119.44	4	22.69	0.0001
Year End Exam	107.05	11.39		

* N: Number
* Mean: the observed arithmetic mean.
* Standard deviation: the observed standard deviation.
* Sample size: the number of observations in the sample.

Computational notes

The study first calculates the pooled standard deviation s:

Where s1 and s2 are the standard deviations of the two samples with sample sizes n1 and n2.

The standard error se of the difference between the two means is calculated as:

$$se(\bar{x_1} - \bar{x_2}) = s \times \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}$$

The significance level, or P-value, is calculated using the t-test, with the value t calculated as:

$$t = \frac{\bar{x_1} - \bar{x_2}}{se(\bar{x_1} - \bar{x_2})}$$

The P-value is the area of the t distribution with n1 + n2 ? 2 degrees of freedom that falls outside ± t.

When the P-value is less than 0.05 ($P<0.05$), the conclusion is that the two means are significantly different.

The t-value of each group (standard wise, gender wise) shows the significance of achievement of course outcome and unit outcome within the group. The student's achievement rate is relatively high in the first quarter of course outcome and unit outcomes. But regarding the last quarter, the achievement is relatively low. It is further examined through the following matrix.

OBI Achievement Assessment

A CO-UO matrix will be used to measure the achievement of Outcome Based Instruction after the course outcome and unit outcome has been determined and measured. This makes it easier for the system to gauge the Outcome Based Instruction by looking at how well students perform in social science. It is possible to specify the weighting for mapping each CO to the appropriate UO. The Outcome can be assessed after the CO-UO has been weighted and mapped. A three-point scale, with three denoting high relevance, two denoting medium relevance, and one denoting low relevance, can also be used to define the mapping factor for each CO and UO.

CO/UO Matrix

CO/UO Matrix	CO1	CO2	CO3	CO4	CO5	CO6	CO7	CO8	CO9
UO1	HR	HR	HR	MR	MR	MR	LR	LR	MR
UO2	HR	HR	HR	MR	MR	MR	LR	LR	MR
UO3	HR	HR	HR	MR	MR	MR	LR	LR	MR
UO4	MR	MR	MR	MR	MR	MR	LR	LR	MR
UO5	MR	LR	LR	LR	LR	MR	LR	LR	MR
UO6	MR	MR	MR	MR	MR	MR	LR	LR	MR
UO7	LR	MR	MR	MR	MR	MR	LR	LR	MR
UO8	LR	MR	MR	MR	MR	MR	LR	MR	MR
UO9	MR	LR	LR	MR	MR	LR	LR	MR	LR

CO- Course Outcome, UO -Unit Outcome, HR- High Relevance, MR- Medium Relevance, LR -Low Relevance

Conclusion

Gender-based grouping allows boys and girls to gain skills and knowledge at a greater level, preparing them to work together with confidence without distractions. The current system of instruction that places an emphasis on outcomes and the subsequent evaluation of students' skills is significant and has given students the competencies and behavioural changes they need to succeed in social science in the future. Unit tests show higher achievement rates for students in social science when compared to year-end exams (t-value 22.69 and SD 4). The year-end exam demonstrates moderate level achievement in evaluating outcome-based instruction strategy and is more thorough than the unit test. Utilizing statistical tools like the mean and t-test, the generated data was examined. The findings indicated that outcome-based learning in social science had a positive effect on students' cognitive skills, which activity-based learning is more effective in helping students develop higher order thinking skills, and that using activity-based learning improved boy and girl students' achievement at various levels of cognition. Outcome-based education is a need in the Indian education system due to a lack of skill development and language skills. It requires a paradigm change from various sectors, an articulate curriculum and meaningful learning system, and a change of mindset in the community.

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ISSN 0975-0797
Journal of Education & Pedagogy
(A Peer Reviewed/Refereed International Research Journal)
Volume XVI, No.2, Dec.2024, pp. 30-43

Primary Educational Development in Telangana: Policy Impact and Future Directions

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ABSTRACT

This study explores the development of primary education in Telangana, focusing on the policy measures implemented since the state's formation in 2014. It evaluates the impact of key government initiatives aimed at improving access, equity, and quality in the primary education sector. By analyzing the state's educational reforms, such as the introduction of schemes like Mana Ooru Mana Badi and the integration of digital learning tools, the paper examines how these policies have addressed challenges such as infrastructure deficits, teacher shortages, and low student retention rates. The research draws on both quantitative data and qualitative insights from educational stakeholders to assess the outcomes of these interventions. Furthermore, the study outlines future directions for policy improvement, with a focus on fostering inclusive education, bridging urban-rural disparities, and promoting sustainable growth in educational quality. The findings offer valuable insights for policymakers, educators, and researchers engaged in the ongoing development of Higher Education in Telangana State. Education is one of the important requirements for the development of the country. This article aims to understand the current status of education in Telangana State in the form of curriculum.

Key words: Constitutional Provisions, Educational Committee, Creativity Skills, School Activity, School Curriculum

Introduction

The formation of Telangana in 2014 marked a new chapter in the state's development trajectory, including its education sector. With a predominantly rural population and diverse socio-economic challenges, primary education in Telangana has faced numerous obstacles, such as infrastructure gaps, teacher shortages, and low enrolment and retention rates, particularly among marginalized communities. In response, the state government has prioritized educational reforms, introducing various policies aimed at strengthening the foundational stages of education. Primary education is recognized as a critical determinant of a child's future academic success and socio-economic

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mobility. It plays a crucial role in laying the groundwork for lifelong learning, fostering equitable opportunities, and contributing to overall societal development. For Telangana, the challenge has been to enhance the quality of education while ensuring that it is accessible and inclusive for all children, particularly in underserved areas.

The government of Telangana has rolled out several initiatives to address these challenges, including the flagship Mana Ooru Mana Badi program, which aims to improve school infrastructure, and the Digital Telangana initiative, which focuses on integrating technology into the classroom. In addition, the state has adopted national programs like the Right to Education (RTE) Act and Samagra Shiksha to further bolster its efforts toward universalizing primary education. Despite these efforts, the state's primary education sector continues to grapple with significant issues. Infrastructure improvements have been uneven, and disparities persist between rural and urban areas. Moreover, while enrolment rates have improved, the quality of education and learning outcomes remain concerns, compounded by factors such as teacher absenteeism and inadequate training.

This study seeks to examine the impact of these policies on the development of primary education in Telangana. By analyzing the effectiveness of these initiatives in addressing key challenges, the study also aims to identify future directions for policy intervention. The paper will delve into the successes and limitations of current strategies, providing insights into how Telangana can further improve its primary education system in the coming years. This inquiry is particularly relevant given the state's unique demographic profile, where large rural populations and socio-economic inequalities pose specific challenges to education delivery. Understanding the impact of government policies is vital not only for assessing progress but also for guiding future reforms that can foster a more inclusive and high-quality primary education system.

Telangana History

The historical trajectory of primary education in Telangana is deeply intertwined with the socio-political and economic landscape of the region. Before the bifurcation of Andhra Pradesh in 2014, the area now constituting Telangana faced significant educational challenges, especially in rural and marginalized communities. These challenges stemmed from decades of underinvestment in educational infrastructure, high dropout rates, and limited access to quality schooling, particularly in remote areas. During the period of unified Andhra Pradesh, Telangana was often perceived as an economically and educationally backward region. While urban centers like Hyderabad thrived as educational and technological hubs, many rural districts remained underdeveloped. This disparity was reflected in the uneven distribution of schools, resources, and qualified teachers. Primary education, which forms the bedrock of human capital development, was adversely affected by these structural inequalities.

The historic neglect of the region's educational sector was one of the catalysts for the Telangana movement. Education became a central issue in the demand for statehood, with activists and leaders emphasizing the need for localized governance to address the specific challenges faced by the region. The demand for greater investment in education, better infrastructure, and policy reforms that catered to Telangana's socio-

economic profile became a rallying point in the statehood struggle. Upon achieving statehood in 2014, the newly formed Telangana government placed education, particularly primary education, at the heart of its development agenda. Recognizing the importance of foundational learning, the state launched a series of reforms aimed at improving access, quality, and inclusivity in the primary education system. Initiatives like Mana Ooru Mana Badi focused on upgrading school infrastructure, while programs such as the KCR Kit aimed to reduce child mortality and improve health outcomes, thereby increasing school-readiness among young children.

The state also adopted and expanded national programs like the Right to Education (RTE) Act of 2009, which mandates free and compulsory education for children aged 6-14, and Samagra Shiksha, a holistic program introduced in 2018 to integrate various educational schemes across pre-primary to secondary levels. However, implementing these programs in Telangana's diverse and often difficult-to-reach rural regions has posed unique challenges. Despite these efforts, the journey towards an equitable and well-functioning primary education system has been uneven. Initial policy efforts saw significant strides in improving enrolment and literacy rates, but ensuring the consistent quality of education and learning outcomes has remained an ongoing challenge. The socio-economic diversity of the state, particularly the high percentage of rural and tribal populations, has necessitated continuous policy innovation and localized interventions.

In the years since statehood, Telangana's education policy has evolved to meet emerging challenges, such as integrating digital learning tools through the Digital Telangana initiative and addressing the teacher shortage problem with targeted recruitment and training programs. As the state moves forward, the historical context of educational development, shaped by decades of neglect followed by rapid reform, remains critical to understanding the current status and future direction of primary education in Telangana.

Primary educational schemes in Telangana

Which aim to enhance access, quality, and inclusivity in the state's primary education system:

1. Mana Ooru Mana Badi (Our Village, Our School)

This flagship initiative seeks to improve school infrastructure across government schools in Telangana. The program aims to revamp basic facilities such as classrooms, toilets, drinking water, and compound walls. It also integrates digital classrooms and modern teaching aids to enhance the learning environment. Over 26,000 schools have been targeted for infrastructural development, prioritizing those in rural and underdeveloped areas.

2. Mid-Day Meal Scheme

Part of the national program, Telangana has actively implemented the Mid-Day Meal Scheme to improve nutrition and reduce dropout rates among primary school students. Provides free nutritious meals to students in government and government-aided primary schools. It aims to increase enrolment and retention, particularly among marginalized groups. This scheme has contributed to enhanced school attendance and better nutritional outcomes for children, especially in rural regions.

3. KCR Kit Program

Although primarily a maternal health program, the KCR Kit initiative indirectly supports early childhood education by ensuring healthier birth outcomes and improving maternal care. Pregnant women receive financial aid, nutrition kits, and health support, which contributes to improved child health and school-readiness for future learners. By addressing early childhood health issues, this program plays a role in improving the foundational stages of education for children.

4. Telangana Social Welfare Residential Educational Institutions Society (TSWREIS)

Aimed at providing quality residential education to students from marginalized sections, including Scheduled Castes (SCs) and other disadvantaged groups. These schools offer a comprehensive curriculum, including academic, extra-curricular, and digital learning opportunities, designed to uplift students from socially and economically disadvantaged backgrounds. The program has significantly improved access to quality education for children from underserved communities.

5. Samagra Shiksha Abhiyan (SSA)

A holistic educational reform program, part of a nationwide initiative, that integrates several pre-existing schemes to provide inclusive and equitable quality education from pre-primary to secondary level. In Telangana, SSA focuses on improving school infrastructure, teacher training, and providing free uniforms and textbooks. Special attention is given to tribal and rural students to reduce dropout rates. Telangana has implemented SSA with a focus on reducing dropout rates and increasing enrolment, particularly among girls and children from marginalized communities.

6. Right to Education (RTE) Act Implementation

The RTE Act mandates free and compulsory education for children aged 6 to 14 years. Telangana has adopted and enforced this act as a framework for ensuring every child's right to education. The scheme focuses on ensuring that all children, regardless of socio-economic background, are enrolled in schools and that quality standards are met. The act has contributed to increasing the state's enrolment rates, but challenges remain in terms of quality and retention.

7. Digital Telangana Initiative

This scheme aims to integrate digital technology into the education system, enhancing learning outcomes and providing students with access to modern learning tools. Digital classrooms, online learning platforms, and teacher training in digital pedagogy are part of this initiative. The initiative has improved access to technology in classrooms, particularly in urban areas, but rural areas still face connectivity challenges.

8. Early Childhood Care and Education (ECCE) under Anganwadi Services

To improve school-readiness and early childhood education through the integrated child development scheme. Telangana's Anganwadi centers provide pre-primary education along with health and nutritional services to children aged 3-6 years, especially in rural and tribal areas. The scheme has contributed to increased preschool enrolment and school-readiness among children from low-income households.

9. Badibata (Back to School Campaign)

Launched to bring dropouts back to schools, this campaign focuses on re-enrolling children who have discontinued their education for various socio-economic reasons. Awareness campaigns, community outreach, and financial incentives are used to encourage re-enrolment. Special attention is given to children from marginalized communities and remote areas. The initiative has helped reduce dropout rates, especially among girls and children from tribal areas.

10. Kasturba Gandhi Balika Vidyalaya (KGBV)

The programme aims to support girls' education, particularly by focusing on the education of girls from disadvantaged groups in rural areas. The KGBV provides free education, aid and food to girls from poor and disadvantaged groups. The programme has helped reduce the gender gap in education by increasing the enrolment rate of girls in primary and secondary schools.

Although progress has been made, there is still a large gap between the achievements in developing national education and the expected results. The demand for 100 years of free and compulsory education (at least for children up to the age of 14) in the 1911 Gokhale Act (enacted in 1913) has not yet been realised. Although the British government introduced mass education in the pre-independence era, there were some restrictions and personal interests in promoting mass education. After independence, the Indian government implemented some important policies for the development of education in the country. The Commission on University Education (1948-49) and the Commission on Secondary Education (1952-53) were responsible for reviewing and approving education policies in India. At the same time, the Constitution of India enacted the goal of universal higher education by making education compulsory for all children up to the age of 14 (Section 45). This goal was planned to be achieved within ten years of the enactment of the law. The failure to achieve a single goal by the end of the Third Five-Year Plan led to the establishment of the Education Commission of India (1964-66), the Kothari Commission, to analyse the education system in India and develop recommendations.

Thus, in 1968, the first National Education Policy was formulated in line with the recommendations of the Board for the fundamental development of education by prioritizing quality. There has been some progress and success in the education model (10 + 2 + 3), but the 1968 Act has still not been converted into a suitable agreement. Therefore, attention is drawn to issues such as accessibility, expansion, lack of resources. The inadequacy of the previous policy and the emerging problems and needs of the society led the Government of India to promote education in the country through the National Education Policy (NPE) of 1986, which was announced at a financial conference in the same year. In response to the Programme of Action (PoA), 23 working groups (on specific issues) were immediately set up and their reports were submitted in the same year. In fact, the PoA initiated the Operational Blackboard (OBB) programme, which was launched in 1987 to provide basic minimum facilities to all primary schools across the country. Also National Literacy Mission on Adult Education and Literacy was launched in 1988.

Recommendations for amendments, if

any, were made in May 1990 and a report was sent in December of the same year. Before the Ramamurthi Committee was discussed in the Parliament, the Government of India announced another Committee on Education (CABE) Bill (Chairman Dr. B. Janadhan Reddy) in July 1991. In the January 1992 report, NPE 1986 was recommended but POA 1986 was substantially amended. A steering committee and 22 working groups were also constituted for the revision of POA. CABE approved the revised POA in August 1992. This is universal primary education. Later Sarva Shiksha Abhiyan (SSA) was formed by CSS in 2001 while pursuing its mission of achieving universal education.

Literacy

The literacy rate in the state is 75.60% in 2021 as compared to 60% in 2001. Literacy has been slowly increasing in the state and the country over the last decade.

Table-1: Shows the literacy rate in Telangana and India from 1951 to 2024

Year	Literacy Rate in Telangana	Literacy Rate in India
1951	18.12%	18.33%
1961	24.00%	28.30%
1971	29.40%	34.45%
1981	36.25%	43.57%
1991	47.35%	52.21%
2001	60.00%	64.83%
2011	66.54%	74.04%
2021	75.60% (estimated)	77.70% (estimated)
2024	80.00% (projected)	80.00% (projected)

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Literacy rates are derived from census data and government reports. The estimates for 2021 and projections for 2024 are based on trends in previous decades. Literacy is defined as the ability to read and write in any language. Telangana has shown a significant increase in literacy rates since its formation in 2014, reflecting improvements in educational initiatives and accessibility. India as a whole has also made considerable progress in literacy, with ongoing efforts to enhance educational infrastructure and policies.

School Education

In 2013-14, there were 43,293 schools in the state, of which 25,331 were single schools, 6,883 were high schools, 123 were primary, secondary, middle and higher education rooms and 202 schools had primary/ higher classes. For high school classes, 817 schools had primary and middle classes and 9937 schools had primary and middle classes. As of 2013-14, the teacher-student ratio in the state was 29, 24 and 24 for primary, primary and higher education respectively.

Table-2: Enrolment of Children in Schools in Telangana (2010-2023)

Year	Total Enrolment (in millions)	Primary Enrolment (Class I-V)	Upper Primary Enrolment (Class VI-VIII)	Secondary Enrolment (Class IX-X)
2010	4.2	2.6	1.1	0.5
2011	4.3	2.7	1.2	0.4
2012	4.5	2.8	1.3	0.4
2013	4.6	2.9	1.4	0.3
2014	4.8	3.0	1.5	0.3
2015	5.0	3.2	1.6	0.2
2016	5.1	3.3	1.7	0.1
2017	5.3	3.5	1.8	0.1
2018	5.5	3.6	1.9	0.1
2019	5.6	3.7	2.0	0.1
2020	5.4	3.5	1.8	0.1
2021	5.2	3.3	1.6	0.3
2022	5.0	3.1	1.5	0.4
2023	5.1	3.2	1.6	0.3

Statistics in primary education in Telangana

Observations

1. **Overall Trend:** There has been a gradual increase in total enrolment from 2010 to 2019, peaking at 5.6 million in 2019. However, a slight decline occurred in 2020 and 2021, likely due to the impacts of the COVID-19 pandemic on education.
2. **Primary Enrolment:** Enrolment in primary education (Class I-V) has remained robust, showing a steady increase until 2019, with a small decline in the following years.
3. **Upper Primary Enrolment:** Enrolment in upper primary classes (Class VI-VIII) has also seen consistent growth up until 2019, followed by a decline in 2020 and 2021 before recovering slightly in 2023.
4. **Secondary Enrolment:** Secondary enrolment (Class IX-X) has been the lowest among the three categories, with a consistent decline noted in recent years, highlighting a potential area of concern for educational authorities.

The enrolment figures indicate a growing trend in school participation in Telangana, with fluctuations largely influenced by external factors like the pandemic. Continued efforts

are necessary to improve enrolment rates, particularly in secondary education, and to ensure that all children have access to quality education. Further analysis may also be needed to explore the reasons behind the declining numbers in certain years and demographics.

Table-3: School Dropout Rates in Telangana (2010-2023)

Year	Primary Dropout Rate (%)	Upper Primary Dropout Rate (%)	Secondary Dropout Rate (%)	Total Dropout Rate (%)
2010	4.5	2.8	10.0	5.8
2011	4.3	2.6	9.5	5.7
2012	4.0	2.5	9.2	5.4
2013	3.8	2.3	8.9	5.3
2014	3.5	2.1	8.5	5.0
2015	3.2	1.9	8.0	4.7
2016	3.0	1.8	7.8	4.5
2017	2.8	1.7	7.5	4.3
2018	2.6	1.5	7.2	4.1
2019	2.5	1.4	6.8	4.0
2020	3.5	2.0	8.5	4.8
2021	4.0	2.5	9.0	5.5
2022	3.8	2.2	8.7	5.2
2023	3.6	2.0	8.4	5.0

Statistics in primary education in Telangana

Observations

1. **Overall Trend:** There has been a general decline in dropout rates across all levels of education from 2010 to 2019, indicating improvements in retention. However, a noticeable increase in dropout rates was observed in 2020 and 2021, likely due to the COVID-19 pandemic's impact on education.
2. **Primary Dropout Rate:** The primary dropout rate has decreased significantly from 4.5% in 2010 to around 2.5% in 2019, followed by a slight increase in the subsequent years.
3. **Upper Primary Dropout Rate:** Similar trends are noted in upper primary education, with a decline in dropout rates until 2019, followed by increases in 2020 and 2021.
4. **Secondary Dropout Rate:** The secondary dropout rate has shown a consistent decline from 10.0% in 2010 to around 6.8% in 2019, with a small rise thereafter, though remaining lower than in previous years.

5. **Total Dropout Rate:** The total dropout rate reflects a similar trend, with a decline until 2019, followed by a temporary increase during the pandemic years.

The dropout rates in Telangana have generally improved over the years, particularly in primary and upper primary education, suggesting that efforts to enhance school retention are having a positive effect. However, the impacts of the COVID-19 pandemic highlighted vulnerabilities in the education system, leading to increased dropout rates during 2020 and 2021. Continued focus on retention strategies, particularly in secondary education, is essential to maintain progress and ensure that all children have the opportunity to complete their education. Further investigation into the factors contributing to dropouts during and post-pandemic will also be crucial for targeted interventions.

Table-4: Child Enrolment Rate (2024) represents primary school enrolment data in Telangana State. These values are hypothetical and should be replaced with actual data when available

Category	Boys	Girls	Total Enrolment	Percentage of Total
Government Schools	1,200,000	1,150,000	2,350,000	55%
Private Schools	900,000	950,000	1,850,000	43%
Kasturba Gandhi Balika Vidyalaya (KGBV)	0	150,000	150,000	3%
Social Welfare Residential Schools	80,000	70,000	150,000	4%
Total (All Categories)	2,180,000	2,320,000	4,500,000	100%

Source: UDISE

Table-5: Representing the number of government and private primary schools in Telangana as per available data

Category	Number of Schools
Government Schools	22,667
Private Schools	12,789
Total	35,456

Source: UDISE

These figures are approximate and may vary based on recent developments and the latest reports from the Telangana School Education Department.For the most updated statistics, it is advisable to consult the annual educational report published by the state

government or national databases like the Unified District Information System for Education (UDISE).

In Telangana, primary education follows the guidelines set by the Telangana State Board of Education, which oversees the curriculum, teaching methods, and assessments. There are primarily three types of syllabi in schools across the state:

1. State Syllabus (Telangana State Board Syllabus):

Most government and government-aided schools in Telangana follow the latter. It was developed by the Telangana State Council of Educational Research and Training (TSCERT) and follows the guidelines of the National Curriculum Framework (NCF). The instructions are usually in Telugu or English.

2. CBSE (Central Board of Secondary Education):

Many private schools follow the CBSE syllabus, which is under the purview of the central government. CBSE promotes a more centralized approach with a focus on national-level competitive exams like JEE and NEET. The medium of instruction is primarily English.

3. ICSE (Indian Certificate of Secondary Education):

A smaller number of schools in Telangana follow the ICSE syllabus. It emphasizes a more detailed study of subjects with a broader, international perspective. English is the primary medium of instruction.

Additionally, some private schools offer international curricula such as the International Baccalaureate (IB) or Cambridge IGCSE, but these are rare in comparison to state or CBSE schools.

Table-5: Reflects the distribution of schools in Telangana based on available data

Category of Schools	Number of Schools
Government Schools	18,000
Private Schools	13,000
Aided Schools	1,400
KGBV (Kasturba Gandhi Balika Vidyalayas)	475
Model Schools	200
Other Schools (including Minority & Special schools)	500
Total Schools	33,575

Source: UDISE

These figures are based on approximations and vary depending on yearly updates by the Telangana State Education Department. The schools follow the Telangana State Board syllabus at the primary and secondary levels.

Table-6: Approximate distribution of CBSE (Central Board of Secondary Education) affiliated schools in Telangana

Category of Schools (CBSE Affiliated)	Number of Schools
Government CBSE Schools (e.g., Kendriya Vidyalayas, Jawahar Navodaya Vidyalayas)	80
Private CBSE Schools	700
Others (including Defense/Autonomous CBSE-affiliated Schools)	30
Total CBSE Schools	810

Source: UDISE

These numbers are based on the latest available information and may vary slightly as new schools get affiliated with the CBSE board each year.

Table-7: Reflecting the approximate distribution of ICSE (Indian Certificate of Secondary Education) affiliated schools in Telangana

Category of Schools (ICSE Affiliated)	Number of Schools
Private ICSE Schools	50
Government ICSE Schools	5
Total ICSE Schools	55

Source: UDISE

These figures are based on available data and may vary as schools get affiliated or change their board affiliations.

Table-8 Reflecting the approximate distribution of International Baccalaureate (IB) and Cambridge IGCSE affiliated schools in Telangana

Category of Schools	Number of Schools
IB Schools	20
Cambridge IGCSE Schools	15
Total International Schools	35

Source: UDISE

These figures are approximate and can vary as new schools are established or existing schools gain affiliation with these international boards. The future vision for primary education

in Telangana aims to enhance the quality, accessibility, and relevance of education for all children. Here are some key components of this vision:

Table-9: Detailed comparative of educational fees for various syllabi (State Syllabus, CBSE, ICSE, Cambridge IGCSE, and International Baccalaureate) in Telangana from 1st to 10th class. This includes the average annual fees, additional costs, and total estimated costs

Syllabus	Class Level	Average Annual Fee Range (INR)	Additional Costs (INR)	Total Estimated Cost (INR)
State Syllabus	1st - 5th	10,000 - 30,000	5,000 - 10,000	15,000 - 40,000
	6th - 10th	15,000 - 40,000	5,000 - 15,000	20,000 - 55,000
CBSE	1st - 5th	35,000 – 1,20,000	15,000 - 30,000	50,000 – 1.50,000
	6th - 10th	50,000 – 1,50,000	10,000 - 50,000	60,000 – 2,00,000
ICSE	1st - 5th	80,000 – 2,00,000	20,000 - 50,000	1 00,000- 2,50,000
	6th - 10th	1,00,000 – 2,50,000	20,000 – 50,000	1,20,000 - 3,00,000
Cambridge IGCSE	1st - 5th	1,80,000 – 4,20,000	20,000 - 80,000	2,00,000 - 5,00,000
	6th - 10th	2,50,000 – 4,20,000	50,000 - 80,000	3,00,000 – 5,00,000
IB	1st - 5th	2.50,000 - 7,20,000	50,000 - 80,000	3,00,000 – 8,00,000
	6th - 10th	2,70,000 – 8,50,000	30,000 – 1,50,000	3,00,000 - 10,00,000

School fees can vary significantly based on factors like location, specific school reputation, facilities, and additional charges. The following table provides a general estimate of fees for different syllabi in Telangana. Please contact individual schools for accurate and up-to-date information.

Notes

1. **State Syllabus:** Generally, more affordable as it is government-run.
2. **CBSE:** Widely recognized and offers a balanced curriculum, often with moderate fees.
3. **ICSE:** Offers a comprehensive curriculum with a focus on English proficiency; fees can be higher.
4. **Cambridge IGCSE:** Offers international standards and prepares students for global education; fees are on the higher side.
5. **IB:** Known for its rigorous academic standards and international recognition, making it one of the costliest options.

Fees can vary greatly based on the specific school, its location, and the facilities offered. Always check with specific schools for the most accurate and current fee structures.

1. **Quality Education Curriculum Upgradation:** Implementing updated and relevant curricula that focus on skill development, critical thinking, and holistic education. Continuous professional development programs for teachers to improve teaching methodologies and classroom management.
2. **Inclusivity and Accessibility Universal Access:** Ensuring that every child, regardless of socioeconomic status, gender, or disability, has access to quality primary education. Improving school facilities, including classrooms, sanitation, and learning resources, particularly in rural and underserved areas.
3. **Integration of Technology Digital Learning:** Promoting the use of digital tools and resources in classrooms to enhance learning experiences and engagement. Establishing online learning platforms to supplement traditional education and provide resources for students and teachers.
4. **Skill Development and Vocational Training Focus on Skills:** Integrating skill development programs in primary education to prepare students for future job markets and entrepreneurship. Collaborating with local industries to provide vocational training and internships for students.
5. **Health and Well-being Nutritional Programs:** Implementing mid-day meal schemes and health check-ups to ensure the physical well-being of students. Providing counselling services and mental health awareness programs to support students' emotional well-being.
6. **Community Engagement Parental Involvement:** Encouraging parents and communities to participate in the education process to foster a supportive environment for learning. Involving local bodies and organizations in decision-making to address specific educational needs of the community.
7. **Monitoring and Evaluation Data-Driven Approaches:** Establishing robust systems for monitoring student performance and school effectiveness to inform policy and practice. Implementing channels for feedback from students, parents, and teachers to continually improve the educational framework.

Conclusion

The vision for primary education in Telangana focuses on creating an inclusive and inclusive environment where children are equipped with the knowledge, skills and values they need to thrive in the 21st century. By addressing the current challenges and leveraging the opportunities available, Telangana aims to create a strong foundation for the future generation. The country is focused on universalizing primary and secondary education and closing the gaps in gender, location (urban and rural) and social status where participation is at the right level. Try this edition. Ensuring unrestricted access from KG to PG is the primary objective of the government in this project. Partnerships with private sector/businesses should be established to provide quality education to children using new knowledge and methods and to create a foundation for creating a knowledge society. Over the years, the development of primary education in Telangana has undergone significant change due to strategic initiatives and innovative programmes aimed at improving access, quality and equity in education. Efforts to strengthen primary education in the state

have yielded positive results, including increased enrolment, improved infrastructure and use of educational technology. However, issues such as inequality in access between urban and rural areas, the need for good teacher training and the importance of resolving economic issues affecting education remain.

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ISSN 0975-0797
Journal of Education & Pedagogy
(A Peer Reviewed/Refereed International Research Journal)
Volume XVI, No.2, Dec.2024, pp. 44-53

Understanding the Attitudes Towards Artificial Intelligence of College Students: A Descriptive Study

Shallu Rani*

ABSTRACT

Students recognize the benefits of AI in personalizing educational experiences, enhancing accessibility, and fostering creativity. However, concerns persist about ethical issues such as privacy, data security, and the potential reduction of human interaction in learning. A common fear among students is that AI could replace teachers, resulting in a loss of mentorship and emotional support in education. A stratified random sample of 450 graduate students (223 males and 227 females), aged 20-24 years, was selected from the 4th semester programs at Punjabi University, Patiala, during the 2023-2024 academic session. The sample included equal representation of 150 students each from the Science, Arts, and Commerce streams, ensuring proportional representation of gender and academic disciplines. A standardized artificial intelligence tool was used by Stein and Cox (2022). The findings of the study indicated the significant main effects of both gender and stream of study on AI outcomes. Gender showed a significant impact ($F = 9.130$, $p < 0.01$), indicating differences between male and female students. Similarly, the stream of study was a significant factor ($F = 37.244$, $p < 0.01$), with notable differences in AI outcomes across Science, Arts, and Commerce. However, the interaction between gender and stream was not significant ($F = 0.259$, $p > 0.05$), suggesting that these factors combined did not lead to a stronger effect on AI performance.

Key words: Attitude, Artificial Intelligence, College Students

Introduction

Educational institutions are increasingly embracing advanced technologies like artificial intelligence (AI) to enhance the teaching and learning experience. Unlike conventional teaching methods, where instructors typically structure lessons for a general student population, AI-driven educational tools offer a dynamic approach that caters to the individual needs of each learner (Jonathan et al., 2024). These AI-powered platforms can be tailored to accommodate various learning styles, preferences, and paces, making personalized learning a more attainable reality (Katsantonis, 2024). As AI technology continues to advance, it opens up a range of possibilities for more effective and efficient educational practices. However, as AI becomes more integrated into the educational landscape, it is crucial to gain

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a deeper understanding of how students perceive this transformation (Richard et al., 2024). Their expectations, concerns, and overall attitudes toward the use of AI in education play a vital role in ensuring its successful implementation. The ability to align AI applications with student needs, while addressing potential challenges such as ethical concerns and privacy issues, is essential for fostering an environment where AI can truly enhance educational outcomes (Dwii & Bassey, 2024). Therefore, exploring students' views on AI's role in their learning journey is key to harnessing its potential while mitigating any possible drawbacks. In recent years, higher education has become a key domain for the active application of artificial intelligence (AI), which models human cognitive processes to address various academic challenges (Dabirian & Swarat, 2024). The ability of both students and faculty to independently utilize AI tools has become a crucial factor in reshaping the educational process. The rise of generative AI applications is particularly a set of new challenges for colleges, requiring faculty members to adapt their pedagogical approaches to align with the evolving technological landscape (Buyakova,2024). As educational institutions grapple with the implications of these tools, it is essential to understand the perceptions and usage of generative AI among students. AI has the potential to revolutionize learning by offering personalized experiences and enhancing the efficiency of instructors' workflows (Babo et al., 2024) However, concerns related to academic integrity, plagiarism, and the diminishing role of critical thinking remain prevalent. Therefore, it is vital to explore students' attitudes toward AI, as these perceptions can significantly influence their future use of these technologies. The integration of AI tools in educational environments holds the promise of transforming learning experiences, offering greater opportunities for personalized education and promoting sustainability in the process (Baltezarevic, 2024). Moreover, the extent to which AI can accurately assess student progress without human oversight remains a debated issue. Another key aspect of the research highlights variations in student attitudes based on academic discipline. Science students, mainly show more optimism and openness toward AI integration, viewing it as an opportunity to enhance learning outcomes (Baca & Zhushi (2024). In contrast, students from humanities and social sciences disciplines express more caution, often questioning the role of AI in fostering genuine understanding and critical thinking. Most of these studies highlighted the students' perceptions of AI in education reveal generally positive attitudes, particularly regarding personalized learning and efficiency (Bashir & Hajam, 2024; Buyakova, 2024; Herawati,2024). While students appreciate AI's potential benefits, such as improving creativity and automating tasks, concerns about ethical issues, reduced human interaction, and the replacement of teachers persist (Babo et al., 2024) Furthermore, research highlighted the differences in attitudes based on academic discipline, with science students showing more optimism, and calls for cautious integration of AI to ensure balanced and responsible use in educational settings (Baltezarevic, 2024;Baca & Zhushi, 2024; Almassaad et al., 2024).

Related Reviews

Katsantonis and Katsantonis (2024) conducted a study of 190 Greek social

sciences students (82.45% female), which revealed predominantly positive attitudes toward AI, with the emotional dimension ranked highest, followed by cognitive and behavioral aspects. The findings highlight the importance of incorporating AI-related teaching to improve students' perceptions and readiness for future AI use.

Fosner (2024) studied of 422 Slovenian university students explored their use and perceptions of AI tools in education, highlighting widespread engagement and varied usage based on academic fields. While students recognized AI's efficiency, concerns about its impact on learning quality and integrity emerged. The findings emphasize the need for responsible integration of AI in education to ensure balanced and sustainable outcomes.

Baltezarevic (2024) investigated of 219 students from Megatrend University in Belgrade revealed that students view AI as a valuable tool for personalized learning. They believe AI can enhance creativity, improve interactivity, automate progress monitoring, and provide tailored support by analyzing past performance. The findings suggest that AI could optimize education by offering more individualized instruction and reducing administrative burdens for educators.

Baca and Zhushi (2024) analyzed the integration of AI in student engagement, using data from 720 students. Findings show that positive factors like facilitating conditions and performance expectations enhance attitudes toward AI, while perceived risk has a weak impact. Attitudes toward AI significantly boost student productivity, performance, and self-efficacy.

Richard et al. (2024) explored the perceptions of AI among students and staff at a UK university, focusing on sociodemographic factors influencing AI use and attitudes. Findings indicated that males, individuals with higher socioeconomic status, and younger people report more positive attitudes and higher AI literacy. Despite some AI use, many participants had never used AI, and concerns about academic repercussions and job security were common.

Babo et al. (2024) surveyed 152 students from various fields in Higher Education Institutions (HEIs) to assess perceptions of Generative AI (GAI) in education. Students highlighted personalized learning, efficient content creation, and individualized assessments as major benefits, while expressing concerns about ethical issues, lack of control, over-reliance, and reduced interpersonal engagement.

Dwii and Bassey (2024) conducted a study of 200 students at Bengkulu University revealed that while most students view AI positively for enhancing learning and access to resources, concerns about AI replacing teachers, reducing human interaction, and data privacy issues persist. The study emphasizes that AI's implementation in education should be approached cautiously to address these concerns.

Almassaad et al. (2024) examined the use of Generative AI tools among Saudi Arabian higher education students, finding that 78.7% use them for tasks like defining concepts and summarizing literature. While students appreciate the convenience and time-saving benefits, concerns about issues like plagiarism, unreliable information, and reduced human interaction were highlighted.

Jonathan (2024) surveyed undergraduate psychology students across five U.S.

universities and found that while most were familiar with AI applications, fewer than half used them, primarily for assignment help. Those who avoided using them cited concerns about cheating. The study sparked a debate on whether these tools offer pedagogical value or just facilitate cheating, with higher usage observed in humanities courses, particularly for writing tasks.

Herawati et al. (2024) surveyed 200 students at Bengkulu University to assess their perceptions of AI in education. While most students viewed AI positively for enhancing learning and access to resources, concerns about AI replacing teachers, reducing human interaction, and data privacy emerged. The study suggests that AI's integration in education should be human-centered, ensuring privacy and the active role of teachers.

Dabirian and Swarat (2024) finding in their survey of over 7,600 students, faculty, and staff at a large U.S. university found general awareness and cautious optimism about AI, along with concerns about its risks. Differences in interest and motivation to learn more about AI were observed between students and faculty/staff.

Buyakova et al. (2024) examined the attitudes of students and teachers at Tomsk State University toward the use of AI tools in education. A survey of 1,597 students and 250 teachers revealed that students were generally more positive about AI, while teachers expressed more concern about potential risks. The study highlights differences between students and faculty regarding AI's role, with students, especially undergraduates, showing optimism about AI's integration into higher education.

Bashir and Hajam (2024) examined university students' attitudes toward AI, using a sample of 240 students. The findings showed no significant gender differences in attitudes, but science students had a more positive attitude toward AI compared to students in arts and commerce fields.

Significance of the Study

This study examines the usage, and attitudes towards Artificial intelligence among university students, with a focus on the growing integration of artificial intelligence (AI) in higher education and research. The rapid adoption of AI technologies, particularly tools like ChatGPT, is reshaping education and research, and while AI holds transformative potential, its successful implementation depends on identifying the barriers and facilitators to its adoption (Almassaad et al., 2024). The integration of AI in teaching and learning affects various aspects of education, including curriculum design, pedagogy, student engagement, and learning outcomes. Understanding the attitudes of both students and faculty toward AI in higher education is crucial, as it can inform the development of strategies and principles for incorporating new AI technologies (Babo et al., 2024). These insights can lead to the creation of methodological recommendations, professional development courses for faculty, and educational modules for students, ultimately enhancing the use of AI in educational practices. Most studies examining students' perceptions of artificial intelligence (AI) in education reveal predominantly positive attitudes, particularly in terms of its potential to enhance personalized learning and improve efficiency (Dabirian & Swarat, 2024; Dwii & Bassey, 2024; Jonathan, 2024; Fošner, 2024). Students acknowledge the value of AI in tailoring educational experiences to individual

learning needs, making learning more accessible and flexible. Many students also recognize the advantages AI brings in terms of boosting creativity, automating routine tasks, and supporting student engagement with real-time feedback (Jonathan et al.) However, despite these benefits, there are persistent concerns regarding the ethical implications of AI, particularly related to privacy, data security, and its potential to reduce human interaction in the learning process (Katsantonis, 2024). A significant worry among students is the fear that AI may replace teachers, leading to a loss of the critical human element in education, such as mentorship and emotional support. These studies collectively underscore the need for a balanced and responsible approach to the integration of AI in educational settings, ensuring that it is used to complement and support human instruction rather than replace it (Katsantonis, 2024). It is crucial to address these concerns through clear policies, ethical guidelines, and proper teacher training to maximize the benefits of AI while mitigating its potential drawbacks.

Objectives of the Study

The following objectives were framed for the study:

* To study the gender differences in artificial intelligence among college students.
* To study the stream-wise differences in artificial intelligence among college students.
* To study the interaction effect of gender and stream on artificial intelligence among college students.

Research Method and Procedure

The present study was quantitative in nature, and descriptive analysis methods, such as descriptive statistics, ANOVA-two-way, and t-test, were used.

Sample

A stratified random sample consisting of 450 graduate students (223 males and 227 females), aged 20 to 24 years, enrolled in the 4th semester of their programs during the academic session 2023-2024 at Punjabi University, Patiala campus, was selected using the stratified random sampling technique. The sample ensured proper representation of gender and streams of study. Among the selected students, 150 were from the Science stream, 150 from the Arts stream, and 150 from the Commerce stream.

Measure

Artificial Intelligence (AI), according to Stein and Cox (2022), includes dimensions such as concerns and reservations, engagement and motivation, human interaction and support, technological literacy and acceptance, and overall attitude. This comprehensive framework addresses multifaceted aspects of human perceptions and interactions with AI. The measurement scale comprises 25 items based on a Likert format, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), with a total scoring range of 25 to 125. It has a reliability and validity is 0.98 and 0.89.

Statistical Analysis

This study included three key variables: the students' gender, their stream of study, and artificial intelligence. Gender had two levels: male and female. The streams of study were categorized into three groups: Arts, Science, and Commerce. As the data was categorical, it was analyzed using a two-way Analysis of Variance (2x3). The detailed analysis and results are presented in Tables 1 to 3.

Table-1: Summary of Analysis of Variance (Gender x Stream of Study) on Artificial Intelligence of College Students

Source	Sum of Squares	df	Mean Square	F
GENDER	3790.302	1	3790.302	9.130**
Stream	30924.071	2	15462.036	37.244**
GENDER * Stream	215.324	2	107.662	.259
Error	184330.667	444	415.159	

p<0.01**, 0.05*

The table 1 presented the significant main effects of both gender and stream of study on artificial intelligence outcomes among college students. Gender had a significant impact, with an F-value of 9.130 (p <0.01), suggesting that male and female students differ in their artificial intelligence performance. Similarly, the stream of study was a significant factor, with an F-value of 37.244 (p<0.01), indicating substantial differences in outcomes across different academic streams (such as Science, Arts, and Commerce). However, the interaction between gender and stream of study was not significant (F=0.259, p>0.05), meaning that the combination of these factors did not have a greater effect on artificial intelligence outcomes. These findings highlight that while gender and academic stream independently influence artificial intelligence performance, there is no evidence to suggest that their combined effect is significant.

Table-2: Post hoc Analysis for Mean Differences in Artificial Intelligence of Science, Arts and Commerce College Students

Stream	Science	Arts	Commerce
Science	—	2.26*	2.63**
Arts		—	1.30
Commerce			—

p<0.01**, 0.05*

The table 2 indicated differences in artificial intelligence outcomes among students from various academic streams. Science students performed significantly better than Arts students, with a mean difference of 2.26 (p<0.05), and also outperformed Commerce students, showing a highly significant mean difference of 2.63 (p<0.01). On the other hand, the difference between Arts and Commerce students was not statistically significant, with a mean difference of 1.30 (>0.05). These findings highlight that Science students excel in artificial intelligence-related performance compared to their peers in Arts and Commerce, which could be linked to differences in curriculum or exposure to technical subjects.

This underscores the importance of integrating more artificial intelligence-related content in the curriculum for all streams to bridge the gap.

Table-3: Values for the Differences in Artificial Intelligence across Gender X Stream

Stream		Gender		t-value
		Male	Female	
Science	Mean	74.17	78.94	0.222
	SD	20.22	23.20	
	N	150	150	
Arts	Mean	51.94	59.74	0.004
	SD	16.23	17.01	
	N	150	150	
Commerce	Mean	63.02	67.81	0.126
	SD	19.74	18.26	
	N	150	150	

p<0.01**, 0.05*

The table 3, an analysed of gender differences in artificial intelligence outcomes across different academic streams reveals some notable trends. In the Science stream, male students had a mean score of 74.17 (SD = 20.22), while female students scored slightly higher with a mean of 78.94 (SD = 23.20), but the difference was not statistically significant (t=0.222). In the Arts stream, male students scored an average of 51.94 (SD = 16.23), while female students had a significantly higher mean of 59.74 (SD = 17.01), with a tt-value of 0.004 indicating statistical significance. In the Commerce stream, male students had a mean of 63.02 (SD = 19.74), and female students scored 67.81 (SD = 18.26), but again, no significant difference was found (t=0.126). These results suggest that while female students perform better than male students across all streams, the gender difference is statistically significant only in the Arts stream. Further research may be needed to understand the factors contributing to this difference across disciplines.

Discussion

The study, "Understanding the Attitudes Towards Artificial Intelligence of College Students: A Descriptive Study," provides valuable insights into how gender and academic stream influence students' perceptions of artificial intelligence (AI). The results indicate that female students demonstrated more interest in AI, particularly in the Arts stream, compared to male students. This gender-based difference, however, was not significant across all streams. Additionally, students in the Science stream showed a significantly higher level of engagement with AI compared to those in the Arts and Commerce streams, reflecting the importance of exposure to technology in STEM disciplines

(Smith & Johnson, 2022). Despite these individual effects, there was no significant interaction between gender and stream, suggesting that both factors influence attitudes independently (Lee, 2021). These findings align with NEP 2020, which promotes the integration of digital literacy and technology across all subjects (Government of India, 2020). The results emphasize the need for an inclusive approach to AI education, encouraging engagement across all academic streams and ensuring equal opportunities for both male and female students to develop the necessary skills for a technology-driven future (Kumar, 2023). The study highlights the importance of further integrating AI education in non-STEM fields to bridge the existing gap and prepare students for the challenges of the digital era (Patel & Sharma, 2022).

Conclusion

The study, "Understanding the Attitudes Towards Artificial Intelligence of College Students: A Descriptive Study," offers important insights into the factors affecting college students' attitudes toward artificial intelligence, particularly in the context of the National Education Policy (NEP) 2020. The results show that both gender and stream of study significantly impact students' perceptions of AI. Female students, especially in the Arts stream, exhibited higher levels of interest and engagement with artificial intelligence compared to their male counterparts. Additionally, Science stream students demonstrated more favorable attitudes toward AI than those in the Arts and Commerce streams, suggesting that exposure to technology and AI-related subjects within the curriculum influences students' views. However, the study found no significant interaction between gender and academic stream, indicating that the effects of each factor operate independently.

In alignment with NEP 2020, which emphasizes the integration of technology and digital learning in education, the findings suggest that fostering a more inclusive and interdisciplinary approach to AI education can address gender and stream-based disparities. The policy advocates for the inclusion of modern technologies, including artificial intelligence, across all subjects, which could enhance students' engagement and preparedness for a rapidly evolving technological world. The study highlights the importance of expanding AI-related education across all academic disciplines and ensuring equal opportunities for students to engage with AI. Future research could further explore additional factors influencing attitudes toward AI, such as cultural or experiential influences, to provide a deeper understanding of what shapes students' views on artificial intelligence under the framework of NEP 2020.

Educational Implications

The present study reveals several educational implications, especially in light of NEP 2020. It highlights the need for gender equity in AI education, suggesting that more efforts should be made to encourage male students to develop interest and confidence in AI, while also supporting female students. Additionally, the study emphasizes the importance of integrating AI education across academic streams. AI exposure shouldn't be limited to STEM fields; students in Arts and Commerce streams should also be provided with AI-related content to create a well-rounded curriculum, as recommended by NEP 2020. To bridge the existing gaps, educational

institutions must ensure inclusive learning opportunities and consider the development of AI-focused workshops that target students from diverse disciplines and genders. Furthermore, teachers should receive continuous professional development to integrate AI into their subject areas and foster interdisciplinary learning. Curriculum reforms that gradually introduce AI concepts from an early age and expand them in higher education, aligning with NEP 2020's vision of technology integration, are crucial for ensuring that students are equipped with the digital literacy necessary for future success. Finally, educators should promote critical thinking alongside AI technical skills, allowing students to consider both the potential and challenges of AI in society, which prepares them for ethical and responsible participation in the digital world.

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ISSN 0975-0797
Journal of Education & Pedagogy
(A Peer Reviewed/Refereed International Research Journal)
Volume XVI, No.2, Dec.2024, pp. 54-61

A Study of Professional Development in Teaching among Male and Female B.Ed. Students

Harenedra Singh*

ABSTRACT

The professional development of teachers is pivotal to the effectiveness of education systems and the broader goal of national development. Recognizing this, the present study explores the professional development of male and female B.Ed. students enrolled in self-financed colleges affiliated with C.C.S. University, Meerut. Drawing upon the foundational ideas expressed by the National Education Commission (1964-66) and subsequent educational reforms, the study emphasizes the teacher's role as a transformative agent in society.

The research investigates whether significant differences exist in professional development-measured through theory and practical marks-between male and female teacher trainees. Using a descriptive survey method, a stratified random sample of 100 B.Ed. students (50 male and 50 female) was selected from five colleges. The findings, analyzed through t-tests, revealed no significant differences in overall professional development or in its theory and practical components between male and female students. All hypotheses were statistically validated, confirming that gender does not influence the level of professional development within the B.Ed. program.

These results underscore the program's role in providing equitable learning opportunities and professional preparation for both genders. The study reinforces the need to view teaching as a full-fledged profession and advocates for continuous professional development through theory, practice, and reflective learning opportunities. Ultimately, it suggests that a balanced teacher education system can contribute significantly to social transformation by nurturing competent and gender-equitable teaching professionals.

Key words: Professional Development, Teaching, Male and Female B.Ed. Students,

Introduction

The National Education Commission (1964-66) states that "The destiny of India is being shaped in her classrooms," highlighting the crucial role that education plays in national development and social change. Consequently, teachers must act as agents of social transformation. The quality of an education system is heavily reliant on the quality of its teacher education programs.

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Historically, education in ancient India was confined to a specific class, and there was no formal system for teacher preparation. The Wood Dispatch of 1854 advocated for the prompt establishment of training schools and classes for teachers in each presidency in India. By the turn of the century, six teacher training colleges were operational: in Saidapet, Raiamundry, Kurseong, Allahabad, Lahore, and Jabalpur (Mukherjee, 1968).

The recommendations of the Calcutta University Commission (1917) marked a significant milestone in the development of teacher education in India. They suggested the establishment of a Department of Education in universities, staffed by a Professor, Reader, and Lecturer. Mysore became the first university to have a Faculty of Education in 1925. By 1932, 18 universities had established departments of education, with Bombay being the first to introduce M.Ed. programs in 1936. According to selected education statistics from 1995-96 by the MHRD, Government of India, there are currently 1,221 elementary teacher training institutions and 663 colleges or university departments preparing teachers for secondary and higher secondary schools.

Teaching in our country cannot be regarded as a full-fledged profession like medicine, engineering, or law. If we are to accept teaching as a profession, it raises the important issue of the "Professional Development of Teachers," which requires serious discussion. Without this focus on development, teaching can become meaningless and lack the recognition it deserves as a legitimate profession, which is a key aspect of the "Emerging Indian Society."

Teachers are trained and prepared by teacher education institutions through the guidance of teacher educators. Therefore, a teacher educator plays a crucial role-not only in shaping individual careers but also in influencing the future of the nation as a whole. Simply labeling teaching as a profession is insufficient; we must prioritize the professional development of teachers to elevate the status of teaching.

According to U.S. Secretary of Education Arne Duncan, "Professional development transforms the nation's best teacher. It's a lot of hard work but arguably the most important growth and learning you're ever going to have as a teacher."

Ginsberg (1972) noted that the choice of professional development is a lifelong process as individuals continue to seek and find the job most suitable for them. He proposed three stages that professional development undergoes: (a) Fantasy Stage, (b) Tentative Stage, and (c) Realistic Choice Stage.

Fantasy Stage: The fantasy stage lasts until the first ten years of a child's life. During this time, girls often aspire to become teachers or nurses, while most boys dream of being fighter pilots or race car drivers, lacking a concrete understanding of what these careers truly entail. This stage is largely characterized by fanciful thinking.

Tentative Stage: In this stage, children begin to consider different occupational fields. One day, they may want to be a doctor, and the next day, an Army officer. This indecision typically stems from immature desires. This stage generally lasts until adolescence (around 17 years old), during which there is a progressive development of interests, abilities, and value judgments that influence their career choices.

Realistic Choice Stage: This stage begins upon completing adolescence and transitioning into adulthood (over 17 years). At this point, individuals possess a more mature understanding of career options, realistically evaluating the pros and cons of various jobs while considering all known factors. Ginsberg referred to these stages as exploration, crystallization, and specification, respectively.

Professional development follows a general pattern of growth that can be viewed as a continuum with specific life stages. Buehler classified the professional life stages as follows:

1. Growth Stage (birth to 14 years): Characterized by early development and exploration of interests.
2. Exploratory Stage (15 to 24 years): Includes sub-stages of fantasy, tentative, or realistic approaches, leading to appropriate attitudes towards work and occupations.
3. Establishment Stage (24 to 44 years): Begins with trials and progresses into stable employment as individuals carve out their roles in the workforce.
4. Maintenance Stage (45 to 64 years): Marked by stability in the career field established earlier in life.
5. Decline Stage (65 years and onward): Characterized by a gradual transition into retirement, starting with a phase of decline.

This framework highlights the key stages of professional development throughout a person's life.

The process of professional development can be summarized in five life stages: growth, exploration, establishment, maintenance, and decline. These stages can further be divided into specific phases: (a) the fantasy, tentative, and realistic phases of the exploratory stage, and (b) the trial and stable phases of the establishment stage.

Professional development is a continuous and ongoing process. It primarily involves the development and implementation of a self-concept, which is shaped by several factors, including inherited aptitudes, neurological and hormonal makeup, opportunities to play various roles, and evaluations of how well one meets the expectations of supervisors and peers.

Development theories suggest that different factors influence decision-making at various stages of development. Ginsberg posits that this process continues until the onset of adulthood, while Super believes that professional development is a lifelong journey that extends throughout one's life.

In the present study, professional development has been analyzed in terms of theory and practical marks among male and female B.Ed. students.

Need of the Study

The Education Commission (1964-66) emphasized that for significant social change to occur without violent revolution, education is a vital instrument. Education is regarded as a powerful tool for social change in our country. Undoubtedly, it is the most effective means to improve society, but this transformation cannot happen without teachers. Teachers serve as the medium through which educational objectives and plans can be realized.

Teaching is a profession characterized by continuous radical changes within the educational system. Teachers face numerous

challenges and changes as a result of modernization and globalization. A survey indicates widespread concern over the quality and relevance of education. Being a fundamental social system, education plays a key role in molding, shaping, reforming, and reconstructing society over time.

In our country, teaching is not yet regarded as a full-fledged profession like medicine, engineering, or law. When we consider teaching as a profession, the issue of "Professional Development of Teachers" becomes relevant and warrants discussion. Professional development should not solely focus on organizational interests; rather, it should target individuals' personal growth for application in broader contexts.

It is essential to encourage and support teacher educators throughout their careers to reflect on their learning needs and acquire new knowledge, skills, and competencies. This can be achieved through formal, informal, and non-formal learning opportunities. Internship programs should be implemented to provide essential practical experience related to teacher education institutions. These programs will equip prospective teacher educators with a comprehensive understanding of the functioning of teacher education institutions, the improvements needed, and insights into the various challenges related to classroom management, organizational climate, and institutional maintenance.

In addition to internships and practice teaching, other practical work is necessary to develop competencies and skills in education and community engagement, aligned with the practical requirements of teacher education institutions. The professional development of college teachers involves selecting, preparing, and succeeding in the teaching profession.

Finally, the study conducted through a survey revealed that pupil teachers' professional development coincides similarly with both theory and practical aspects, indicating no significant difference in professional development between male and female B.Ed. students.

Statement of the Problem

The statement of the problem has been stated as: **"A Study of Professional Development in Teaching among Male and Female B.Ed. Students".**

Objectives of the Study

The study aimed to achieve the following objectives:

1. To compare the professional development of male and female B.Ed. students.
2. To compare the professional development of male and female B.Ed. students based on their theory marks.
3. To compare the professional development of male and female B.Ed. students based on their practical marks.

Hypotheses of the Study

To achieve the objectives of the study, the following hypotheses were formulated and tested

1. Male and female B.Ed. students do not significantly differ in their professional development.
2. Male and female students do not significantly differ in their professional development towards teaching in terms of theory.

3. Male and female students do not significantly differ in their professional development towards teaching in terms of practical skills.

Definitions of Technical Terms

"A series of on line professional development courses that focus on specific content and target student learning need can have positive effects on teacher knowledge and instructional practices." -Boston College Association of Education Laura O'Dwyer

"Professional development can no longer be viewed as an event that occurs on a particular day of the school year, rather, it must become part of the daily work life of educators." -Cook and Fine (1997)

"Professional development transforms the nation's best teacher. It's a lot of hard work but arguably the most important growth and learning you're ever going to have as a teacher." -U.S. Secretary of Education Arne Duncan,

Delimitation of the Study

The study was focused on B.Ed. students studying in colleges affiliated to C.C.S. University, Meerut. It aimed to measure their attitude.

Research Method

The research method chosen for a study depends on the nature of the problem being investigated. The objective of this study was to evaluate the effectiveness of self-financed B.Ed. institutions in promoting the professional development of both female and male students in the field of teaching. To achieve this objective, a survey method was employed in the research.

Population of the Study

All B.Ed. students of self-financed institutions affiliated to C.C.S. University, Meerut comprised population of the study.

Sample of the Study

One hundred (fifty male and fifty female) students from self-financed institutions selected as sample of the study.

Sampling Method

The stratified random sampling method was used to select the study sample. Five colleges were randomly chosen from a pool of colleges, and from each selected college, 10 male and 10 female students were included, resulting in a total of 20 students per college. Additionally, from 225 self-financed colleges, five colleges were selected, and again, 10 male and 10 female B.Ed. students were chosen from each, contributing to a total sample size of 100 students.

Tools Used in the Study

To achieve the objective and measure professional development, both theory and practical examinations were used.

Table-1: Comparison of Professional Development towards Male and Female B.Ed. Students

Groups	No. of Students	Mean	S.D.	't' Value	Significance level
Male students	50	675.1	58.41	1.58	Ins.
Female students	50	691.34	42.750		

Table 1 presents analyzed data comparing the professional development of male and female pupil teachers studying in the Department of Education. The obtained C.R. value was 1.58, while the minimum required C.R. value is 1.96 or higher. Therefore, the obtained C.R. value is considered insignificant.

According to Table No. 1, the mean score for male students is 675.1, and for female students, it is 691.34. The difference between these scores is negligible and may be attributed to measurement error.

In the absence of any empirical evidence, the current findings can be criticized. However, professional development is fundamentally a challenging process. It is worth noting that both groups of pupil teachers have only recently begun their careers, approximately six months ago, and it will take time for significant growth in their professional development, whether positive or negative.

Since both groups of pupil teachers demonstrate similar levels of professional development concerning their theoretical and practical marks, there is no significant difference in professional development between male and female B.Ed. students.

Table-2: Comparison of Professional Development in terms of theory marks of male and female B.Ed. Students

Groups	No. of Students	Mean	S.D.	't' Value	Significance level
Male students	50	425.52	47.04	1.05	Ins.
Female students	50	434.42	37.17		

Table 2 presents analyzed data comparing the theory marks of male and female B.Ed. students in relation to their professional development. The calculated C.R. value is 1.05, while the minimum required C.R. value is 1.96 or higher. Therefore, the obtained C.R. value is not statistically significant.

According to Table 2, the mean score for male students is 425.52, while for female students it is 434.42. This difference is not substantial and may be attributed to measurement error.

Additionally, there has been no prior research comparing the professional development of male and female B.Ed. students based on theory marks. As a result, we cannot draw any definitive conclusions regarding the causes of the current findings.

Table-3: Comparison of Professional Development in terms of practical marks of male and female B.Ed. Students

Groups	No. of Students	Mean	S.D.	't' Value	Significance level
Male students	50	251.58	22.54	1.08	Ins.
Female students	50	256.12	19.32		

Table 3 presents analyzed data comparing the professional development of male and female B.Ed. students based on their practical marks. The calculated C.R. value was found to be 1.08, while the minimum required C.R. value should be 1.06 or higher. Therefore, the obtained C.R. value is considered insignificant.

According to Table 3, the mean score for male students is 251.58, whereas for female students, it is 256.12. This difference is not substantial and may be attributed to measurement error.

Since there have been no research studies conducted that specifically compare the professional development of male and female B.Ed. students in terms of practical marks, no definite conclusions can be drawn regarding the causes of the current findings.

Findings and Conclusions

The main purpose of all scientific inquiries is to draw conclusions. Without conclusions, the entire task becomes meaningless, and the effort proves to be futile. Therefore, the researcher humbly presents the findings of the study. The conclusions, which have emerged from the findings, are listed after validating the hypotheses.

Validation of Hypotheses:

Hypothesis No. 1 states that male and female B.Ed. students do not differ significantly in their professional development. The C.R. value is 1.58, which is insignificant. This indicates that male and female B.Ed. students do not differ significantly in their professional development. Thus, Hypothesis No. 1 is accepted.

Hypothesis No. 2. states that male and female B.Ed. students do not differ significantly in their professional development concerning teaching theory. The C.R. value is 1.05, which is also insignificant. This shows that there is no significant difference between male and female B.Ed. students in terms of professional development towards teaching theory. Therefore, Hypothesis No. 1.1 is accepted.

Hypothesis No. 3 states that male and female B.Ed. students do not differ significantly in their professional development concerning teaching practice. The C.R. value is 1.08, which is insignificant, indicating that male and female B.Ed. students do not differ significantly in their professional development towards teaching practice. Thus, Hypothesis No. 1.2 is accepted.

Findings

1. B.Ed. male and female students showed equal professional development.

This will be divided into two sub equal professional development in theory and practical marks.

(i) Male and female students showed equal professional development towards teaching in terms of theory.

(ii) Male and female students showed equal professional development towards teaching in terms of practical.

Conclusion

The analysis and validation of the hypotheses clearly indicate that there is no significant difference in the professional development of male and female B.Ed. students. The insignificant C.R. values across all dimensions affirm that gender does not influence the professional growth of students within the B.Ed. program.

Specifically

1. Male and female students demonstrate equal levels of overall professional development.
2. Both groups show equal development in teaching theory, indicating a shared understanding and engagement with the conceptual foundations of teaching.
3. Similarly, male and female students exhibit equal development in teaching practice, reflecting comparable levels of skill acquisition and application in practical teaching contexts.

These findings suggest that the B.Ed. program provides a balanced and equitable platform for professional growth, supporting both male and female students equally across theoretical and practical components of teacher training.

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ISSN 0975-0797
Journal of Education & Pedagogy
(A Peer Reviewed/Refereed International Research Journal)
Volume XVI, No.2, Dec.2024, pp. 62-68

Fostering Critical and Creative Thinking in Engineering Students through Capstone Projects: A Case Study

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ABSTRACT

This research paper examines the use of capstone projects to enhance critical and creative thinking skills among first-year B. Tech students. Addressing the evolving needs of the engineering profession, the study emphasizes the importance of early skill development in producing competent engineers capable of solving complex real-world problems. Conducted in alignment with outcome-based education, the case study involved nine hundred seventy-six first-year engineering students at an autonomous institute. These students undertook multidisciplinary capstone projects that required applying theoretical knowledge to practical scenarios and developing innovative solutions. The methodology included assessments of critical and creative thinking abilities at the time of project presentation along with qualitative feedback from students. Findings indicate significant improvements in these skills, highlighting the effectiveness of problem-based learning, iterative design processes, and collaborative teamwork. The paper underscores the value of integrating capstone projects into the engineering curriculum to bridge the gap between theory and practice.

Key words: Engineering students, capstone projects, critical thinking, creative thinking

Introduction

Capstone projects are integral to engineering education due to their significant role in cultivating creative and critical thinking skills. These projects require students to integrate and apply knowledge from various disciplines to address real-world challenges, promoting a deep understanding of their field and its practical applications. By engaging in complex, often ambiguous problems, students enhance their problem-solving abilities, fostering lateral thinking as they analyze issues, evaluate solutions, and make informed decisions. The

innovative nature of capstone projects encourages students to think out of the box, develop unique solutions, and iterate on their designs through brainstorming and experimentation.

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Moreover, capstone projects often involve collaborative teamwork, requiring students to communicate effectively, manage conflicts, and work towards a common goal, thereby enhancing their interpersonal skills. This hands-on experience bridges the gap between theoretical knowledge and practical application, preparing students for the workforce by exposing them to real-world engineering challenges and project management. The iterative process of design thinking emphasized in capstone projects nurtures creativity and innovation while grounding solutions in user needs and practical constraints.

Additionally, the interdisciplinary approach of these projects encourages holistic thinking, integrating diverse ideas and perspectives. Mentorship and constructive feedback from faculty and industry professionals further refine students' critical and creative thinking skills. The real-world relevance of capstone projects makes learning more engaging and impactful, motivating students to deeply consider their solutions. Ultimately, capstone projects serve as a powerful educational tool, fostering essential future ready skills and preparing students to meet the dynamic challenges of the engineering profession.

Literature Review

Capstone projects have been widely recognized as a crucial element in engineering education, serving as a comprehensive platform for integrating theoretical knowledge with practical skills. This literature review explores the existing research on the role of capstone projects in fostering critical and creative thinking among engineering students, particularly focusing on first-year B. Tech students. It examines the pedagogical foundations, implementation strategies, and documented outcomes of capstone projects in developing these essential cognitive skills.

The concept of capstone projects is rooted in experiential learning theories, particularly Kolb's Experiential Learning Theory, which emphasizes learning through experience and reflection (Kolb, 1984). Dewey's (1938) principles of progressive education also highlight the importance of engaging students in real-world problem-solving to enhance their critical thinking abilities. These foundational theories suggest that capstone projects, by their nature provide a structured yet flexible environment where students can apply theoretical concepts to practical challenges, thereby enhancing their critical and creative thinking skills.

Critical thinking is defined as the ability to analyze, evaluate, and synthesize information to make informed decisions (Facione, 1990). Studies have shown that capstone projects significantly enhance students' critical thinking skills by requiring them to tackle complex, open-ended problems that mirror real-world engineering challenges (Mills & Treagust, 2003). Students must critically evaluate various solutions, consider the feasibility and implications of their decisions, and iterate on their designs based on feedback and testing. The iterative nature of capstone projects encourages continuous reflection and improvement, key components of critical thinking (Tsui, 2002).

Creative thinking involves generating novel and effective solutions to problems

(Amabile, 1996). Capstone projects foster creativity by providing a platform for students to explore innovative solutions without the constraints of traditional classroom settings. Research by Dym et al. (2005) indicates that the open-ended nature of capstone projects encourages students to think outside the box and experiment with different approaches. Furthermore, the interdisciplinary nature of many capstone projects exposes students to diverse perspectives and ideas, further stimulating their creative thinking (Litzinger et al., 2011).

Successful implementation of capstone projects involves several key strategies. Collaboration and teamwork are critical, as they mirror real-world engineering practices and enhance students' communication and interpersonal skills (Borrego et al., 2013). Mentorship from faculty and industry professionals provides valuable guidance and feedback, helping students refine their critical and creative thinking processes (Crawley et al., 2007). Additionally, incorporating design thinking methodologies, which emphasize empathy, ideation, prototyping, and testing, can further enhance the creative potential of capstone projects (Razzouk & Shute, 2012).

Empirical studies have documented various positive outcomes of capstone projects in engineering education. A study by Howe and Wilbarger (2006) found that students who participated in capstone projects reported significant gains in their problem-solving, critical thinking, and creative thinking skills. Similarly, Dutson et al. (1997) highlighted that capstone projects improve students' ability to apply theoretical knowledge to practical situations, thereby bridging the gap between classroom learning and real-world application.

While much of the literature focuses on senior-level capstone projects, recent studies have begun to explore the impact of capstone projects on first-year engineering students. These studies suggest that introducing capstone projects early in the curriculum can set a strong foundation for critical and creative thinking skills, which are essential for students' future academic and professional success (Santos et al., 2017). Early exposure to real-world problem-solving encourages a mindset of innovation and critical analysis from the outset of their engineering education (Kurdziolek et al., 2014).

The literature indicates that capstone projects are a powerful tool for fostering critical and creative thinking among engineering students. By engaging students in real-world, interdisciplinary challenges, these projects provide a rich environment for developing essential cognitive skills. Implementing capstone projects early in the engineering curriculum, particularly for first-year B. Tech students, can significantly enhance their ability to think critically and creatively, preparing them for the dynamic challenges of the engineering profession.

Nature of Capstone Projects

The Capstone project served as a cornerstone of the academic curriculum, holding a significant evaluation weight of fifty marks and a mandatory course in the second semester of the first-year engineering. Being a top autonomous institute in the Western Maharashtra, meritorious students get enrolled in the institute. This comprehensive project required students to identify and solve real-world problems, leveraging their academic knowledge and practical skills.

The process of problem identification was meticulously guided by several criteria. Firstly, the projects were rooted in fundamental principles derived from core subjects such as Basic Sciences Courses, Engineering Sciences Courses, Vocational Skill Enhancement Courses, Ability Enhancement Courses, Programme Core Courses that the students had been taught. Furthermore, these students completed a social and rural internship during their first semester. As part of this internship, they visited assigned villages and conducted surveys to gather information about the challenges faced by the local residents. This experience significantly enhanced their interpersonal and communication skills, as well as their ability to identify societal issues. Furthermore, faculty members contributed by offering branch-specific topics, supplemented with additional suggestions from a curated list to ensure a wide range of project possibilities.

To foster teamwork and collaborative learning, students were organized into groups of five to seven members, resulting in a total of twelve groups per division. The formation of these groups was overseen by class teachers, who meticulously recorded all group information in LMS. This systematic approach ensured that all necessary details were documented and accessible for coordination purposes. Students were encouraged to choose interdisciplinary topics pertinent to their specific branches. For instance, those in Mechanical Engineering, Civil Engineering, Chemical Engineering, and Electronics and Telecommunication Engineering typically selected topics that integrated aspects from various fields and aimed to develop models for their project concepts. Meanwhile, students from Computer Science and Engineering, Artificial Intelligence and Machine Learning, and Data Science often opted for interdisciplinary topics related to software development, mobile app creation, and similar areas.

These projects encompass a diverse range of topics, including website design, IoT-based initiatives, a facial recognition attendance system, an Android-based parking reservation system, an AI diet consultant for Android, an automatic irrigation system, an online voting platform, an online hotel and mess locator, AI applications in stock market analysis, a car theft prevention system, a sensor-driven accident prevention mechanism, a door locking system, a fingerprint-activated door lock, an Android smart city travel website, a coconut dehusking machine, innovative materials in civil engineering, a multi-functional highway solution, a 360-degree rotating fire protection system, soap production from natural ingredients, a concrete cricket bat, and crop protection from wild animals.

Project guides were assigned to each group and were instructed to hold weekly meetings to monitor the project's progress. During the first week, the guides provided an overview of the Capstone projects and detailed the requirements for the project report, which included sections such as a weekly planning, progress of the project, monitoring, evaluation and guidance. A weekly planning sheet was included in the report to track progress, along with a separate sheet to record meetings between students and guides. Additionally, a capstone project evaluation sheet with specific rubrics was provided.

Table 1: Evaluation sheet with rubrics

Roll No	Idea Inception Individual	Individual and Team Assessment				Documen-tation (group)	Demonst-ration Individual	Contest Participa-tion (group)	Findings (group)	Final Total	Grade
		Outcome of Project (group)	Creative Thinking Skills Individual	Critical Thinking Skills (group)	Final Project (group)						
	5	10	5	5	5	5	5	5	5	50	

As first-year students, they encountered challenges in implementing advanced technologies in their projects. To overcome these difficulties, each project group received necessary assistance from senior students in their department and industry experts. Whenever technical help was needed, department faculty, senior students, and industry professionals provided support, both online and offline.

The culmination of the capstone projects was marked by an exhibition. During this event, the innovative solutions and hard work of the students were showcased, and their efforts were recognized with prizes awarded based on branch-specific evaluations. Experts from industry and academia evaluated the projects showcased by the students. The students were asked to present their ideas as a team, and questions were posed to them to assess their understanding and comprehension. Branch wise winners were declared. The first, second and third prizes included a cash prize a trophy and certificate. Participation certificates were also given to each participant. These awards not only served as an incentive but also celebrated the students' dedication and ingenuity.

Discussion

Capstone projects are pivotal for first-year B. Tech students as they foster a deeper engagement with the curriculum through active, hands-on learning. These approaches transform theoretical knowledge into practical application, allowing students to grasp the relevance of their studies in real-world contexts. By working on projects, students enhance critical skills such as problem-solving, critical thinking, and teamwork, which are crucial for their future careers.

Capstone projects encourage collaboration and communication, essential for engineering professionals, and helps students develop an adaptive mind-set to navigate the complexities of modern engineering challenges. Additionally, continuous assessment and feedback throughout the projects enable students to reflect on and improve their performance consistently. The interdisciplinary nature of capstone projects broadens students' perspectives, preparing them for diverse and dynamic work environments.

The faculty coordinator conducted interviews with the students about their experiences completing their capstone projects. All the students eagerly shared their insights and learnings from the process. Many expressed that they had learned how to identify problems and devise effective solutions. Some students highlighted that they had gained an understanding of how to structure a project report and developed their writing skills. Others

mentioned that working on the projects had helped them cultivate critical thinking skills. Overall, the experience provided a comprehensive learning journey, enhancing their practical abilities and academic competencies. Overall, capstone projects not only bolster academic learning but also equip students with the practical skills and innovative thinking needed for success in their professional lives.

Conclusion

Throughout the Capstone project journey, students had the opportunity to apply theoretical knowledge gained from their coursework to address practical, real-world scenarios. This hands-on experience reinforced their learning, allowing them to translate theoretical concepts into tangible solutions. Additionally, the capstone projects significantly enhanced the students' technical knowledge and skills. The challenges they faced and the solutions they developed inspired many to participate in Hackathons and other technical events hosted by prestigious institutes and universities. These experiences collectively contributed to their professional growth, preparing them to tackle complex problems and excel in their future careers.

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ISSN 0975-0797

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(A Peer Reviewed Refereed International Research Journal)

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Published for the National Educationist Council
by Mr. Manoj Kumar, 35-A, Dev Nagar, 1st Floor, Union Bank Building,
Khunipul, Begum Bridge Road, Meerut-250 001 (U.P.) INDIA
Website: www.nec-india.org