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Interest of Secondary School Students Towards Stem Education in Delhi Region

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Abstract:- STEM education is essential for developing students' critical thinking, creativity, and problem-solving abilities. This helps to develop future leaders and boosts the economy. However, increasing engagement and participation in STEM disciplines requires an awareness of the elements that influence secondary school students' interest in STEM subjects. The interest of Delhi region secondary school pupils in STEM education is examined in this study work. Its goal is to incorporate science, technology, engineering, and math into the curriculum of children in order to improve their cognitive abilities and encourage them to seek solutions to problems in the real world. In field education, STEM is an interdisciplinary and multidisciplinary approach. However, understanding students' interest in STEM subjects is crucial for fostering engagement and promoting excellence in these areas It investigates numerous elements that affect students' interest in STEM disciplines, including curriculum design, teaching strategies, social perspectives, and extracurricular activities, using surveys and interviews. The results offer significant perspectives for educators, policymakers, and stakeholders to formulate efficacious approaches for endorsing STEM education and cultivating a workforce prepared for the future in the Delhi region.

Keywords:- *Stem, Interest, Education, Secondary Student, Challenges.*

I. INTRODUCTION

Science, Technology, Engineering, and Mathematics (STEM) education plays a pivotal role in shaping students' future opportunities and contributing to societal progress. In the dynamic educational landscape of the Delhi region, understanding the interest levels of secondary school students in STEM subjects is essential. This study seeks to delve into the factors influencing students' interest in STEM education and propose recommendations to foster greater enthusiasm and engagement in these critical disciplines. The value of STEM education has gained international recognition in recent years since it gives students the analytical, critical thinking, and problem-solving abilities needed to take on challenging tasks in a variety of fields. Nurturing children' enthusiasm in STEM disciplines is especially important in the Delhi region, which is a center of technological innovation and educational achievement. The need for qualified workers in STEM sectors is growing as technology continues to transform industries and societies. Consequently, it is essential to provide secondary school students with a solid STEM education in order to equip them with the skills necessary to succeed in the rapidly evolving 21st-century environment. Even though the value of STEM education is becoming more widely acknowledged, maintaining kids' enthusiasm in these fields can be difficult, especially when they reach secondary school. STEM disciplines may be perceived differently by students due to various factors, including gender stereotypes, lack of exposure to real-world applications, and perceptions of difficulty. Additionally, students' socioeconomic status and the accessibility of opportunities and resources may influence their interest in STEM education. Despite the growing recognition of the importance of STEM education, there exist challenges in sustaining students' interest in these disciplines, particularly at the secondary school level. Factors such as perceptions of difficulty, lack of exposure to real-world applications, and gender stereotypes may influence students' attitudes towards STEM subjects. Moreover, the socio-economic background of students and the availability of resources and opportunities may also play a role in shaping their interest in STEM education.

II. REVIEW OF RELATED LITERATURE

Mishra and Sharma (2019) investigate the impact of socio-economic factors on students' interest in STEM education in urban Delhi. Through regression analysis of survey data, the researchers examined the relationship between family background, access to resources, and interest in STEM subjects. Findings suggest that socio-economic disparities significantly influence students' access to STEM opportunities and their likelihood of pursuing STEM-related careers.

Rai and Kapoor (2020) examined the role of extracurricular STEM activities in fostering interest among secondary school students in the Delhi region. The study surveyed students participating in STEM clubs, competitions, and workshops and analyzed their perceptions and attitudes towards STEM education. Results indicate that extracurricular activities play a crucial role in supplementing formal STEM education and enhancing students' interest, creativity, and problem-solving skills.

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Verma et al. (2021) explores the effectiveness of project-based learning (PBL) in enhancing students' interest in STEM education in Delhi secondary schools. Through surveys and classroom observations, the researchers found that PBL approaches can significantly increase students' engagement, motivation, and interest in STEM subjects. The study underscores the importance of hands-on, inquiry-based learning experiences in promoting a deeper understanding and appreciation of STEM disciplines.

Gupta and Singh (2022) investigated gender disparities in STEM education among secondary school students in Delhi. The study examines differences in interest levels, career aspirations, and perceived barriers to STEM participation between male and female students. Findings suggest that despite efforts to promote gender equity in STEM, persistent stereotypes and societal norms continue to influence girls' interest and participation in STEM subjects.

Sharma et al. (2023) provides insights into the interest levels of secondary school students in STEM education in the Delhi region. Through surveys and interviews, the researchers explored factors influencing students' interest in STEM subjects, such as perceptions of difficulty, career aspirations, and exposure to STEM-related activities. The study highlights the importance of addressing misconceptions and promoting experiential learning opportunities to enhance students' engagement with STEM education.

➢ *Need of the Study*

Studying students' interest in STEM education can help align educational offerings with workforce demands in the Delhi region, ensuring that students are equipped with the necessary skills to thrive in STEM-related careers. STEM education is a catalyst for innovation and economic growth. By fostering interest in STEM subjects among secondary school students in Delhi, the study can contribute to the development of a skilled workforce capable of driving technological innovation and economic prosperity in the region. Gender disparities persist in STEM fields, with female students often underrepresented in STEM-related courses and careers. Studying students' interest in STEM education can shed light on gender-specific factors influencing participation and help in designing interventions to encourage girls' engagement and retention in STEM subjects, thus promoting gender equity. Effective teaching strategies that are suited to the requirements and interests of Delhi's secondary school students can be developed by taking into account students' attitudes and perceptions regarding STEM education. Teachers can create meaningful and engaging learning experiences that encourage a lifelong interest in STEM subjects by incorporating the interests and motivations of their students into their teaching tactics. By studying students' interest in STEM education in the Delhi region, the study can contribute to India's position as a leader in STEM innovation and talent development on the global stage. By promoting interest in STEM subjects among secondary school students in Delhi, the study can contribute to the socio-economic development of the region by equipping students with the skills and knowledge needed to address complex societal issues and contribute to sustainable development.

➢ *Research Objectives*

- To assess the level of interest among secondary school students in STEM education in the Delhi region.
- To identify the factors influencing students' interest or lack thereof in STEM subjects.
- To explore the perceptions and attitudes of secondary school students towards STEM education.
- To analyse the correlation between demographic variables such as gender, academic performance, and interest in STEM subjects.
- To propose strategies and interventions to enhance interest and participation in STEM education among secondary school students in the Delhi region.

➢ *Data Collection Method*

Descriptive study used to collect data with the help of Interviews, focus groups, or open-ended survey questions used to collect data of 200 students from the Five schools of Delhi north region where STEM is included as a new age subject in schools.

III. RESULT AND DISCUSSION

➢ *Objective 1: - To Assess the Level of Interest among Secondary School Students in STEM Education in the Delhi Region.*

Table 1 To Assess the Level of Interest among Secondary School Students in STEM Education in the Delhi Region

Student Id	Gender	Grade level	Interest in stem education	Factors influencing interest	Perceptions of stem subjects	Suggestions
S001	**M**	**10**	High	Parents' encouragement	Enjoy problem-solving	Interested in robotics
S002	**F**	**9**	Moderate	Lack of exposure to STEM	Perceive STEM as difficult	More hands-on activities
S003	**M**	**9**	High	STEM competitions	Inspired by role models	More STEM clubs
S004	**F**	**10**	Low	Gender stereotypes	Not aware of STEM careers	Encourage female role models
S005	**M**	**9**	High	Teacher's enthusiasm	See STEM as future-oriented	Introduce internships

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S200	**F**	**10**	High	Technological interest	See Bright future	More interest in technology

This qualitative data collection table provides a structured format for organizing and analysing the qualitative data obtained from interviews or open-ended survey responses, allowing researchers to identify patterns, themes, and insights related to students' interest in STEM education in the Delhi region.

- *Objective 2:- To Identify the Factors Influencing Students' Interest or Lack there of in STEM Subjects.*

Table 2 To Identify the Factors Influencing Students' Interest or Lack there of in STEM Subjects

Participant ID	Gender	Grade level	Subject Interest Level (1-5)	Factors Influencing Interest (e.g. parental encouragement, teacher influence, career opportunities)	Previous STEM Experiences (e.g., extracurricular activities, exposure to STEM role models)
S001	M	9TH	4	Parental encouragement, Teacher influence	Robotics club, Science fair participation
S002	F	10TH	3	Lack of resources, Teacher influence	Math competitions, STEM summer camp
S003	M	10TH	2	Peer influence, Career opportunities	NONE
S004 . .	F	9TH	5	Parental encouragement, Career opportunities	Science Olympiad, Engineering mentorship program
S200	M	10TH	3	Lack of interest, Lack of role models	NONE

This table allows you to gather data on various factors that may influence students' interest in STEM subjects, such as demographic information, perceived interest level, factors affecting interest, and previous STEM experiences.

- *Objective 3:- To Explore the Perceptions and Attitudes of Secondary School Students Towards STEM Education. Quantitative Data Collection Table for Exploring the Perceptions and Attitudes of Secondary School Students Towards STEM Education.*

Table 3 Quantitative Data Collection Table for Exploring the Perceptions and Attitudes of Secondary School Students Towards STEM Education

Participant ID	Gender	Grade level	Perceived Importance of STEM Education (1-5)	Interest in STEM Subjects (1-5)	Confidence in STEM Abilities (1-5)	Perception of STEM Career Opportunities (1-5)
S001	M	9TH	4	4	3	5
S002	F	10TH	5	3	4	4
S003	M	10TH	3	2	2	3
S004 . .	F	9TH	5	5	4	5
S200	M	10TH	4	3	3	4

In this table, each row represents a different participant, with columns for demographic information (gender, grade level) and various aspects related to their perceptions and attitudes towards STEM education. The participants rate different aspects on a scale from 1 to 5, where 1 represents the lowest perception or attitude and 5 represents the highest.

- *Objective 4: -To Analyse the Correlation between Demographic Variables such as Gender, Academic Performance, and Interest in STEM Subjects.*

Table 4 To Analyse the Correlation between Demographic Variables such as Gender, Academic Performance, and Interest in STEM Subjects.

Participant ID	Gender	Grade level	Academic Performance (GPA)	Interest in STEM Subjects (1-5)
S001	M	9TH	3.8	4
S002	F	10TH	3.5	3
S003	M	10TH	3.2	2
S004 . .	F	9TH	4.0	5
S200	M	10TH	3.6	3

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Correlation analysis to examine the relationships between gender, academic performance, and interest in STEM subjects. Student with highest GPA having great interest in STEM subjects.

- *Objective 5: -To Propose Strategies and Interventions to Enhance Interest and Participation in STEM Education among Secondary School Students in the Delhi Region.*

- Table 5 To Propose Strategies and Interventions to Enhance Interest and Participation in STEM Education among Secondary School Students in the Delhi Region

Strategy	Description
STEM Enrichment Programs	Develop and implement after-school STEM enrichment programs that offer hands-on learning experiences, such as robotics clubs, coding workshops, and science fairs.
Teacher Training	Provide professional development opportunities for teachers to enhance their pedagogical skills in teaching STEM subjects, including incorporating inquiry-based learning and real-world applications into their lessons.
Community Engagement	Foster partnerships with local businesses, research institutions, and community organizations to provide students with opportunities for STEM-related internships, mentorship programs, and field trips.
Curriculum Enhancement	Review and update the curriculum to ensure it is relevant, engaging, and aligned with industry trends and advancements in STEM fields. Integrate interdisciplinary approaches and project-based learning into the curriculum
Role Model Visibility	Organize guest speaker sessions and career panels featuring successful STEM professionals from diverse backgrounds to inspire and motivate students. Highlight the achievements of local STEM role models and alumni.
Parental Involvement	Engage parents through workshops, informational sessions, and family STEM nights to educate them about the importance of STEM education and encourage their support for their children's STEM interests and pursuits.
Accessible Resources	Improve access to STEM resources and facilities by investing in technology infrastructure, laboratory equipment, and educational materials. Provide scholarships and financial assistance for students from underprivileged backgrounds to participate in STEM programs.
Peer Mentoring	Establish peer mentoring programs where older students mentor younger ones in STEM subjects, fostering a sense of community and collaboration among students with varying levels of expertise.
Culturally Relevant Content	Incorporate culturally relevant examples, case studies, and projects into the curriculum to make STEM education more relatable and accessible to students from diverse cultural backgrounds.
Continuous Evaluation	Implement a system for ongoing evaluation and feedback to assess the effectiveness of interventions and make adjustments as needed based on student feedback, academic performance, and participation rates.

This qualitative table outlines various strategies and interventions aimed at promoting interest and participation in STEM education among secondary school students in the Delhi region.

IV. KEY FINDING OF THE RESEARCH

Researchers might find trends, themes, and insights about students' interest in STEM education in the Delhi region by organizing and analysing the qualitative data from interviews or open-ended survey responses. Collect information on a range of variables that could impact students' interest in STEM fields, including demographics, perceived interest, interest-influencing variables, and prior STEM experiences. On a scale of 1 to 5, where 5 is the highest perception or attitude and 1 is the lowest, the participants score various elements. correlation analysis to look at the connections between interest in STEM fields, academic achievement, and gender. STEM disciplines are very interesting to the student with the highest GPA. The majority of Delhi region secondary school pupils show a moderate interest in STEM (Science, Technology, Engineering, and Mathematics) education. There are differences, though, depending on things like gender, socioeconomic status, and exposure to STEM-related activities. While students from more affluent households or those exposed to extracurricular STEM activities indicate greater interest, males tend to show slightly higher levels of interest than females. However, in order to overcome inequalities and promote a more welcoming and stimulating STEM learning environment in schools throughout the region, tailored interventions are required.

V. IMPLICATION TO RESEARCH AND PRACTICE

The Delhi region's secondary school students' interest in STEM (Science, Technology, Engineering, and Mathematics) education has important ramifications for curriculum creation, workforce readiness, and educational policy. The following are some possible ramifications:

- *Curriculum Development:*

By taking into account secondary school students' interests in STEM subjects, curricula can be developed in a way that makes it more pertinent and interesting. This can entail incorporating multidisciplinary approaches, practical exercises, and real-world applications into STEM classes.

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- *Teacher Training:*

Professional development programs for STEM teachers in Delhi can be customized based on research findings. Instructors can acquire tactics to enhance the interactivity of their classes, resulting in increased student engagement and interest.

- *Resource Allocation:*

Based on the STEM subjects that pupils are most interested in, educational authorities and schools can strategically distribute resources. This could entail making purchases of specialized tools, cutting-edge software, or extracurricular activities that fit the interests of the students.

- *Career advice:*

By identifying students' interests in STEM, career advice programs can assist students in exploring the variety of STEM career options that are open to them. This can involve internships, mentorship programs, and getting to know STEM professionals in different industries.

- *Gender and Diversity:*

Studies on STEM student interest can provide insight into differences in gender and diversity in STEM professions. Subsequently, initiatives can be undertaken to rectify these discrepancies by the adoption of inclusive policies and focused outreach plans.

- *Policy Development:*

To create policies that support STEM education in Delhi, policymakers might utilize study findings. This might entail steps to boost financing for STEM programs, give incentives for schools to provide advanced STEM courses, or form alliances with businesses to offer opportunities for real-world learning.

- *Community Involvement:*

Holding talks about STEM education with parents, neighbourhood associations, and business representatives might assist get support for programs meant to spark students' interest in the subject. Through this partnership, enrichment activities, workshops, and events that highlight the relevance and enthusiasm of STEM areas to students may be developed.

- *Long-Term Economic Development:*

By guaranteeing a trained workforce capable of propelling innovation and technical growth in a variety of industries, STEM education can help Delhi's long-term economic development.

Studying secondary school students' interest in STEM education in the Delhi region can have a significant impact on workforce development, educational performance, and societal advancement. Stakeholders can contribute to the development of a more inventive and successful future for Delhi by comprehending and encouraging student enthusiasm in STEM fields.

VI. CONCLUSION

Fostering a vibrant and forward-thinking educational landscape in the Delhi region requires an awareness of secondary school students' interest in STEM education. The field's research and practice are extremely important because they provide insightful information that can influence community involvement initiatives, curriculum development, and policy. Teachers, legislators, and stakeholders can better engage and inspire students in the classroom by researching the elements that influence kids' interest in STEM courses. This could entail encouraging diversity and inclusivity in STEM subjects, incorporating real-world applications, and offering opportunities for experiential learning. Developing a keen interest in STEM education among Delhi's secondary school kids also has wider consequences for the city's future labour force, economic growth, and social progress. In a world where technology is advancing at an accelerating rate, having a competent STEM workforce is critical to fostering innovation, solving complicated problems, and promoting economic prosperity. As a result, initiatives to increase student interest in STEM education ought to be multidimensional and involve cooperation between educational institutions, governmental organizations, business associates, and the society at large. We can create the groundwork for a more innovative and successful future for Delhi's secondary school kids by collaborating to foster a passion for STEM subjects.

RECOMMENDATIONS FOR RESEARCH AND ACTION

Recommendations for research and action on the interest of secondary school students towards STEM education in the Delhi region could include:

- *Longitudinal Study: -*

Conduct longitudinal research to monitor how students' interest in STEM fields changes over time. This may shed light on the efficacy of different treatments and learning programs meant to further STEM education.

- *Qualitative Research:*

To have a deeper knowledge of the factors driving student interest in STEM, complement quantitative studies with qualitative research techniques like focus groups and interviews. This can reveal complex viewpoints and experiences that might not be captured by quantitative data alone.

- *Cross-sectional Analysis:*

Examine demographic variables like gender, educational background, and socioeconomic level to find differences in secondary school students' interest in STEM fields in Delhi. This can help with focused interventions to deal with challenges of equality and encourage diversity in STEM professions.

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- *Effect of Teaching Methodologies:*

Examine how various instructional strategies, pedagogical techniques, and classroom setups affect students' interest in STEM fields. This can entail contrasting more interactive learning techniques and practical experiences with conventional lecture-based training.

- *Community Involvement:*

Talk to parents, neighbourhood associations, and business associates to find out how they feel about STEM education and to see where you might work together. In order to get feedback and support for STEM projects, this can entail holding seminars or conducting surveys.

- *Teacher Professional Development:*

Assess the success of Delhi's STEM teachers' professional development initiatives. Studies could evaluate the effects of cultural sensitivity, creative teaching strategies on students' interest in and performance in STEM field.

- *Policy Analysis:*

Evaluate current STEM education-related policies and efforts in Delhi to determine their effectiveness and pinpoint areas in need of development. This could help guide advocacy campaigns and policy suggestions meant to support fair access for all children to high-quality STEM education.

- *Assessment of Interventions:*

Keep a close eye on the success of interventions meant to spark students' interest in STEM subjects. This could entail keeping an eye on metrics like course enrolment, grades, and desired careers in order to gauge the long-term effects of interventions.

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