

Attitude of Secondary School Students Towards Stem Education

Dr. Sangeeta Chauhan¹, Ms. Shivangi Shrivastava², Prof. PK Astalin³

¹Assistant Professor, Babasaheb Bhimrao Ambedkar University, Lucknow

²Research Scholar, Babasaheb Bhimrao Ambedkar University, Lucknow

Received: 10/09/2022, Review-1: 07/10/2022, Review-2: 08/11/2022, Accepted: 12/12/2022

Abstract

This study aims to examine the attitude of secondary school students towards STEM education. STEM stands for Science Technology Engineer Mathematics. STEM is one of the most significant educational movements in the recent years. Today's science, technology, engineering and mathematics become national priority. Report of the Academic Competitiveness Council, 2007 and The Opportunity Equation and policy makers have suggested that STEM focused school as one possible solution. STEM is a new concept in the field of education which aim is to integrate disciplines of science, technology, engineering and mathematics in the students' curriculum so that their cognitive skill may increase and they seek to solve real life problem. STEM is interdisciplinary and multidisciplinary approach in the field education. STEM education is new concept in the 21st century which aims to replace age-old teaching and learning process and to raise individual with 21st century skills based on the integration of science, technology, mathematics. This research used Descriptive survey type and the design used was Cross-sectional survey design. STEM increased students motivation, achievement and most importantly learning interest. The population consisted of secondary school students of U.P. Board and C.B.S.E. Board students in Lucknow city. The researchers used purposive sampling for collecting data. 146 samples were taken from the population secondary school students by using self-developed tools namely Attitude Scale towards STEM education. The study found significant difference in attitude of male and female secondary school students towards STEM education i.e. male had high attitude towards STEM education whereas females compare to male had low attitude. Also the study reveals that there was no significant difference between U.P. board and C.B.S.E. secondary school students towards STEM education. These findings can help teachers to understand the importance of STEM education and change the teaching and learning process by increasing students' interaction and engagement.

Keywords: STEM Education, Secondary School Students, Attitude

Introduction

In the recent years there is the drastic change in the learning and teaching approach, the new form of learning emerged i.e., STEM education in India and others parts of the world. STEM education aims to educate students in the disciplines of science, technology, engineering, and mathematics as a whole. We are living in the 21st C.E. where Technology is the intrinsic part of the people. Technology not only ease the work of the people but also brought new ways of acquiring knowledge of the world. It's very important to be science and technology literate not only for developed countries but also for the developing countries. Today every educational institution integrated STEM education in their curriculum which changes the process of age-old teaching learning system of education. STEM education provides more extensive base of real-life learning skills and develop their cognitive and technical skills. STEM concept rises new generations children equipped with new ways of innovations and an ability to think creatively. STEM is centered on collaborative education, problem-based education and enquiry-based education. Every stage of education of the students plays a pivotal role in his life. This is why due consideration should be given in child overall development. Considering this the researchers want to study Impact of gender and board of school on STEM approach at secondary stage students as per NEP 2020 i.e. IX to XII standards (age 14 to 18) of the students is considered very important stage as it is link between primary and higher stage education whatever students learn in this stage must retain for longer time in his near future so this stage should be developed properly and there should be proper incorporation of science and technology in their curriculum so that he or she can unrivalled in the field of science and technology.

Review of Related Literature

In the current study researcher examined articles covering the variables STEM approach and secondary school students Chaudhary, Megha (2020) studied The Effect of STEM Technology Program on Academic Achievement of Elementary School Students an Experimental Research and used quasi-experimental research type and found that the student's attitude towards STEM programme was positive. Uswatun Hasanah (2020) studied The

Impacts of STEM Instruction on Strengthening High School Students' Reasoning Skills and found that there was a statistically difference in student's reasoning skill between the STEM group and traditional group. Ozcan Hasan (2019) studied The Impact of Teaching the Subject "Pressure" with STEM Approach on the Academic Achievements of the Secondary School 7th Grade Students and Their Attitudes towards STEM. The researcher found the significant difference between the two groups-experimental group, control group the former shown the more positive attitudes towards STEM. Kratika (2022) studied Teachers Awareness and Attitude towards integrating STEM Education in Teaching and Learning A Study and for this the researcher used Descriptive survey research method and stratified sampling technique and purposive sampling technique and chosen 302 elementary school teachers in Delhi NCR and them employed self-employed tools for collecting data. The researcher used parametric test and found that there was smallest percentage of elementary teachers that had higher awareness of STEM education. Tunc et al., (2021) studied Teachers' Views of the Implementation of STEM Approach in Secondary Schools and The Effects on Students and researcher finds that the teachers was in hesitation to implement STEM activities in classrooms. Emrah Higde et al., (2022) studied the effects of STEM activities on students' STEM career interests, motivation, science process skills, science achievement and views and found that STEM activities developed positive attitude on students. Researcher found limited literature under the current variables being studied. That's why researcher selects these problems for further research.

Significance of the Study

With the advancement and development of technology in our lives its become very necessary to evaluate and monitor plans for incorporating technology into education system and equip our students with 21st C.E skills. Our age-old education system had not kept pace with the rapid developments in global education also our Indian educational system more precise students on textbook learning and memorization. This is mostly due to the lack of a comprehensive STEM programme which emphasize on learning and fun together. Our India's Prime Minister Mr. Narendra Modi, has set

out to make India the manufacturing capital also digital India of the world, the country's academic institution particularly in STEM subject came under the pressure to produce highly professional graduates. In order to prepare students for this new age development and to equip them with science and technology skills will need to place high priority on STEM approach and integrate this into students school curriculum and made an integral part of it specifically on secondary school students as this is very important face of the students life which is link with primary and higher education whatever students learn in this stage will retain for longer time by building their basic knowledge and confidence. This STEM approach already outreaches in some parts of the country. Thus, the researcher under the present study wants to find out the attitude of secondary school students towards STEM education.

Rationale of the Study

Education is necessary tool that help us to eliminate all social evil prevailing in the society, to develop the nation and its citizen and most importantly to educate our students with the changing needs of the society. As we are living in the 21st C.E. so it become mandatory to teach and educate and make our students familiar with the necessary skills required to sustain in their life i.e., skills related to operating technology- its importance and used, knowledge of basic science, mathematics and engineering skills so that they can compete with the other developed nation. Currently in the world new concept of education emerged i.e., STEM education. STEM stands for Science, Technology, Engineering and Mathematics a new approach in teaching and learning which integrates various disciplines of science, technology, engineering and mathematics so that the students high order thinking skill increase and they can connect to real life world. In the present study the researcher wants to see the impact of STEM approach on attitude of secondary school students. Secondary education is very important level of education as this is link with primary and higher education. It is very important to develop basic concepts of the students in this stage only so that whatever the students inherit in this stage will transmit to next level. There are many researches which was timely conducted on the concept of STEM education. CHRISTINE V. McDONALD (2016), Ozcan Hasan (2019), Chaudhary, Megha (2020),

Uswatun Hasanah (2020), Sirakaya, Mustafa et al. (2020), Tunc et al., (2021, Kratika (2022), Emrah Higde et al., (2022) are the researcher who found positive attitude towards STEM education and they also support our present study.

Statement of the Problem

STEM is a recent idea and is gaining importance in India, but studies in this field are not carried out to study its impact on secondary school students. STEM is considered to be an effective element for the learning process and to improve conceptual understanding of 21st century skill. STEM education is where the academic concepts are coupled with real- world lesson. Therefore, in the presence education system, educational institution incorporated STEM approach in their curriculum but still it's not implemented on the large scale. Therefore, researcher carried out this research under the formal heading "Attitude of secondary school students towards STEM Education."

Research Questions

1. Does the attitude of secondary students towards STEM Education differ in terms of gender?
2. Is there any significance difference between the attitude of secondary students towards STEM Education of U.P. Board and C.B.S.E Board?

Research Objectives

1. To compare the attitude of secondary students towards STEM Education in relation to their gender
2. To compare the attitude of secondary school students of U.P. Board and C.B.S.E. Board towards STEM education

Research Hypotheses

1. There is no significant difference in the attitude of secondary students towards STEM Education in relation to their gender
2. There is no significant difference in the attitude of secondary school students of U.P. Board and C.B.S.E. Board towards STEM education.

Operational Definition

Stem Education

STEM education is an approach to learning that integrates the disciplines of science, technology, engineering and mathematics.

Secondary School Education

Secondary School education is the secondary stage of the students learning between the age of fourteen to eighteen.

Research Methodology

- A) **Method** - A descriptive survey method was used.
- B) **Design of the Study** - Cross Sectional Survey design was used.
- C) **Population** - The study population consists of secondary school students of U.P. Board and C.B.S.E. Board in Lucknow city.
- D) **Sample**-146 secondary school students (62 students from UP board and 84 students from CBSE board) have been taken as a sample from the selected four secondary schools.
- E) **Sampling Method**- In the present study purposive sampling was used to select the secondary school students. Four secondary schools (two schools from UP board and two schools from CBSE board) were purposely selected.

VARIABLES - In this study, secondary school students were assessed with reference to their attitude towards STEM education. So, the variables of the study are-

1. Gender
2. Types of School
3. Attitude towards STEM education

USED TOOL - Researchers have been used self-developed tool namely "Attitude Scale towards STEM Education".

USED STATISTICAL TECHNIQUE - Mann Whitney U test is used to analyse the data selected by purposive sampling.

Statistical Analysis-

Objective-1- To compare the attitude of secondary students towards STEM Education in relation to their gender.

H01-There is no significant difference in the attitude of secondary students towards STEM Education in relation to their gender.

Table - 1.0

Mean and Standard Deviation of Students' Attitude towards STEM Education in relation to their gender

Gender	N	Mean	SD	Mann Whitney U Test	Obtained p-value	p-value
Male	70	186.1	9.76	378.7	0.01	<0.05
Female	76	135.6	18.9			

According to Table-1.0, the mean and standard deviation (SD) for male and female students are 186.1 and 135.6 respectively and 9.76 and 18.9 respectively. Researcher applied Mann Whitney and obtained P value of 0.01, which is significantly less than 0.05. It shows that the attitude of STEM education among male and female students of secondary level differs significantly. Hence, the hypothesis is rejected.

On the basis of the analysis, researcher found that male students have high attitude than female students.

This statistical analysis also supports the findings of others researcher like Elena et al. (2019), Sabrina et al. (2019), Rumadani et al. (2019) and etc.

Objective-2 - To compare the attitude of secondary school students of U.P. Board and C.B.S.E. Board towards STEM education

H02-There is no significant difference in the attitude of secondary school students of U.P. Board and C.B.S.E. Board towards STEM education

Table - 2

Mean and Standard Deviation of Students' Attitude towards STEM Education in relation to their type of school Board

School Board	N	Mean	S.D.	Mann Whitney U-test	Obtained p-value	p-value
U.P.	62	139.2	19.9	899.85	0.785	>0.05
C.B.S.E.	84	141.8	21.6			

1.1, Mean and Standard Deviation (SD) of U.P. Board and C.B.S.E Board students are 139.2 and 141.8 respectively and 19.9 and 21.6 respectively. Researcher applied Mann Whitney and obtained P value of 0.01, which is significantly greater than 0.05. It shows that the attitude of STEM education among students of U.P. Board and C.B.S.E. Board secondary level does not differ significantly. Hence, the hypothesis is accepted.

On the basis of the analysis, researcher found that there is no significant difference in the attitude of secondary school students of U.P. Board and C.B.S.E. Board towards STEM education.

Conclusion

The main focus of the present study is to analyze the impact of gender and type of school on STEM education on secondary school students. The result shows that there is the difference in the male and female attitude towards STEM approach, male have high attitude towards STEM approach whereas female don't have. This may be due the reason that male take more interest in disciplines like science and technology than female. The result also reveal that there is no difference in the attitude of U.P. Board and C.B.S.E. Board secondary school students towards STEM approach may be due to the reason that there are equal educational opportunity in both the boards and the students regularly visit the computer lab, science lab etc. so they develop the positive attitudes towards STEM approach. These findings shows that the students irrespective of gender and school board has positive attitude towards the STEM approach.

References

- Chaudhary, Megha (2020). The Effect of STEM Technology Program on Academic Achievement of Elementary School Students an Experimental Research. Shodhganga@INFLIBNET. Retrieved from. <http://hdl.handle.net/10603/415791>
- Christine V. Mcdonald (2016). STEM Education: A review of the contribution of the disciplines of science, technology, engineering and mathematics. Science Education International. Retrieved from. <https://files.eric.ed.gov/fulltext/EJ1131146.pdf>
- Emrah Higde et al. (2022). The effects of STEM activities on students' STEM career interests, motivation, science process skills, science achievement and views. ELSEVIER. <https://doi.org/10.1016/j.tsc.2022.101000>
- Elena et al. (2019). The Gender Gap in STEM Fields: The Impact of the Gender Stereotype of Math and Science on Secondary Students' Career Aspirations. Frontiers in Education. <https://doi.org/10.3389/educ.2019.00060>
- Kratika. (2022). Teachers Awareness and Attitude towards integrating STEM Education in Teaching and Learning: A Study. Shodhganga@INFLIBNET. Retrieved from <http://hdl.handle.net/10603/412985>
- Rumadani et al. (2019). The Effectiveness of STEM-Based on Gender Differences: The Impact of Physics Concept Understanding. Eurasian Journal of Educational Research. Doi.10.12973/eu-jer.8.3.753
- Sabrina et al. (2019). The Impacts of Gender and Subject on Experience of Competence and Autonomy in STEM. Frontiers in Psychology. <https://doi.org/10.3389/fpsyg.2019.01432>
- Sirakaya, Mustafa et al. (2020). The Impact of STEM Attitude and Thinking Style on Computational Thinking Determined via Structural Equation Modeling. Journal of Science and Technology. Retrieved from. <https://doi.org/10.107/s10956-020-09836-6>
- Tunc et al. (2021). Teachers' Views of the Implementation of STEM Approach in Secondary Schools. MODESTUM OPEN ACCESS. Research Article. <https://doi.org/10.29333/pr/9295>
- Uswatun Hasanah. 2020. The Impacts of STEM Instruction on Strengthening High School Students' Reasoning Skills. Science Education International. DOI. 10.33828/sei.v31.i3.6