Analysis of the Levels of Awareness of School Teachers toward STEM Education

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ABSTRACT
STEM education, which stands for science, technology, engineering, and mathematics, has drawn a lot of attention recently because it has the ability to help kids develop their critical thinking, problem-solving, and innovative skills. Though teachers, who have a significant impact on how students learn, must be aware of and comprehend STEM education in order for it to be implemented successfully. The goal of this study was to examine how knowledgeable school teachers are about STEM education. The study looks at the variables that affect teachers’ awareness, investigates the difficulties they encounter when adopting STEM education, and suggests methods to raise teacher awareness for successful STEM integration in the classroom environment.

Keywords: STEM, Levels of Awareness, Teachers’ awareness

INTRODUCTION
STEM education, which stands for Science, Technology, Engineering, and Mathematics, has drawn a lot of attention recently since it strongly emphasises teaching students to think critically, solve problems and prepare for professions in STEM fields. The effectiveness of STEM education strongly depends on how well-informed and knowledgeable school teachers are of its guiding concepts, processes, and advantages. The purpose of this analysis is to gauge how well-informed school instructors are about STEM education and all of its facets. The phrase “STEM Education” is widely heard in the educational setting. Science, Technology, Engineering, and Mathematics are referred to as STEM. STEM education may aid in a nation’s industrialization, competitiveness in the global market, and development of trained manpower in rapidly developing professional domains.

At a critical juncture when the Indian government is supporting programs like ‘Make in India’, ‘Skill India’, and ‘Digital India’ to boost manufacturing, the use of technology, and skill development in the nation, STEM is emerging as a key and fundamental part of our education (Malti 2017). The ‘Million Minds Augmenting National Aspiration and Knowledge’ (MANAK) initiative draws gifted young boys and girls to study science and work in research.

So, STEM can result in a workforce that is more diverse and is a group of people that work well together as a team. Recent developments in science and technology have had an impact on the economies, educational systems, and social structures of the countries and have sparked the development of new strategies. STEM approach can be divided into levels of awareness of school teachers toward it and all these levels need to be focused before utilizing it as a teaching method.

Objectives
The main objective of the present research was framed as “Analysis of the Levels of Awareness of School Teachers toward STEM Education”.

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A random sampling method was used to ensure an adequate representation of teachers from various streams and the desired level of statistical significance. Informed consent was obtained from all participants, ensuring their voluntary participation and confidentiality of their responses. (See Figure 1)

The research was limited to a specific geographical area or a certain number of schools, which may affect the generalizability of the findings. The analysis was primarily focused on teachers’ awareness levels and may not capture their actual implementation of STEM education practices. With the help of this research, it was possible to compare teachers in elementary and secondary schools who are male and female and work in urban environments.

Figure 1: Distribution of sample

The study aimed to provide insights into the levels of awareness of school teachers toward STEM education, contributing to the understanding of the current state of STEM education implementation. Gautam Buddha Nagar served as the source of the sample. To ensure that the samples chosen for the study were statistically representative. According to their affiliations, both public and private schools were fairly represented. The majority of the study’s sample consisted of teachers from both public and private schools. For the survey, a total of 110 samples were collected. (See Table 1)

Table 1 shows the number of teachers who participated in the survey as per the schools. Five schools have partaken in the survey. Among these, the number of teachers who contributed their part as per the schools is represented in Table 1 (See Figure 2).

Objective 1: To study and compare the level of awareness of science and arts teachers toward STEM education.

H₀₁: There is no significant difference in the level of awareness between science and arts teachers toward STEM education.

In this calculation, the value of the alpha (α) level α = 0.05 was taken (See Table 2). This means that the conclusions of this test are valid 95% of the time. Degrees of freedom came 4.

Table 2: Level of Awareness of Teachers as per the Streams

<table>
<thead>
<tr>
<th>Level of Awareness</th>
<th>Science</th>
<th>Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (146-200)</td>
<td>12 (18%)</td>
<td>6 (14%)</td>
</tr>
<tr>
<td>Average (55-145)</td>
<td>56 (82%)</td>
<td>34 (81%)</td>
</tr>
<tr>
<td>Low (0-54)</td>
<td>0</td>
<td>2 (5%)</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 3: The calculation for the t-statistic

<table>
<thead>
<tr>
<th>Levels of Awareness</th>
<th>Science(X)</th>
<th>Arts(Y)</th>
<th>d = X - Y</th>
<th>d^2</th>
</tr>
</thead>
<tbody>
<tr>
<td>High (146-200)</td>
<td>12</td>
<td>6</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Average (55-145)</td>
<td>56</td>
<td>34</td>
<td>22</td>
<td>484</td>
</tr>
<tr>
<td>Low (0-54)</td>
<td>0</td>
<td>2</td>
<td>-2</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>42</td>
<td>26</td>
<td>524</td>
</tr>
</tbody>
</table>

t-statistic was equal to 1.04. In Table 3 the computed t-statistic was less than the critical t-value. Therefore, the test concluded that there is no evidence of a statistically significant difference between the two populations. Therefore, we cannot reject the null hypothesis H₀₁. Thus, we can say that there is no significant difference in the level of awareness between science and arts teachers toward STEM education.

Objective 2: To study and compare the level of awareness of male and female teachers toward STEM education.

H₀₂: There is no significant difference in the level of awareness between male and female teachers toward STEM education.

For the study of this objective collected data are shown in Tables 4 & 5 and Figure 2.

Table 4: Percentage of participation of Male and Female Teachers

<table>
<thead>
<tr>
<th>Teachers Participation</th>
<th>Male %</th>
<th>Female %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of Teachers</td>
<td>13</td>
<td>87</td>
</tr>
</tbody>
</table>
Objective 3: To study and identify the level of awareness of school teachers within the dimensions of STEM education.

Three dimensions of STEM education i.e., Clarity of the concept, Self-efficacy and Subject knowledge were taken to study the level of awareness of school teachers toward STEM education. On these three dimensions, teachers’ opinion was taken on a five-point scale related to their items. (See table 7)

Figure 4 represents the distribution of the items in the tool on the basis of dimensions of awareness according to the ratings. This shows that the majority of the teachers agreed that they are having good subject knowledge. Whereas in the case of clarity of the concept the majority of the teachers just agreed on it. While in the case of self-efficacy, the majority of the teachers strongly agreed with it.

Conclusion

The purpose of the present research work was to investigate teachers’ knowledge, understanding, and perception towards STEM (Science, Technology, Engineering, and Mathematics) education. The analysis revealed a general positive awareness of STEM education among school teachers. While most teachers recognized the importance of STEM and its potential benefits for students.

There are challenges related to implementation, resource availability, and professional development for STEM education. Addressing these challenges through comprehensive support systems, adequate training, and collaboration with stakeholders can help teachers effectively incorporate STEM education into their classrooms and provide students with valuable learning opportunities. Additionally, efforts to promote gender equity and diversity within STEM education should be emphasized to ensure equal access and representation for all students.

References


