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Research Article

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Steam Awareness Among University Students: An Investigation

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Abstract

Education is such type of advanced machine from which if anyone uses this machine consequences change in behaviour and gives adaptation and adjustment skills such that a person can become a responsible, capable, and independent individual to make competent in making their own decision in their life. As taking an example of a vehicle in which different parts like differential, gearbox, brake, engine etc. as whole make the vehicle in a similar fashion any subject is not only specific it is also integrated as whole.in a similar fashion concept of STEAM (science, technology, engineering, arts, mathematics) it was previously in the form of STEM(science, technology, engineering, mathematics) as a paradigm change that occurred with the move from STEM to STEAM in order to achieve integrative and lifelong holistic education from subject and discipline. As functioning of STEM and STEAM has not much difference only the addition of ARTS in STEM forms STEAM addition of arts fosters Creativity, risk-taking habits, collaborative, and experiential learning to fulfil the all-round and holistic development which NEP-2020 talks all about. and according to NCF-2005 teaching subjects or content knowledge as specific is not effective as it is seen in integrated fashion to make more conceptual clarity. STEAM develops different skills to sustain 21st-century skills like Adaptability skills, communication skills, social skills, problem-solving skills, Creativity, self-control, Scientific thinking, cooperation skills and imagination and curiosity power among individuals. The objective of the research was to compare mean scores of Awareness towards STEAM of University students of science and Social Science University students. The present study was a cross-sectional survey in nature. All the University students present in session 2023-24 of Gujarat sample size of the present research was 141 of which 71 from science and 70 from social science students of University in Gujarat. it was seen that there is no difference in the awareness about STEAM among University students.

Keywords: Steam, Holistic Development, Self-Control, Scientific Thinking

1. Introduction

University Students in Gujarat have much more awareness about STEAM (science, technology, engineering, arts, mathematics) STEAM concept with education is called STEAM Education. Integration of science, technology, Engineering, arts, and mathematics full fill the 21st-century needs and required skills. Regarding STEAM education, there are two things to be aware of. It first encompasses arts integration, which is the process of relating a discipline or art form to other subject areas. Studies reveal that Engaging kids in arts-integrated learning enhances their physical, social, emotional, and cognitive abilities. Science, Technology, Engineering, Arts, and Mathematics is referred to as STEAM.

The goal of STEAM education as a whole is to collaborate to develop innovative models, designs, and technologies that address pressing issues in society. The truth is that higher education institutions tend to find the value of a STEAM education to be so compelling that it will help students be employable in the future [1]

In the field of STEM and STEAM (or STE(A)M) education, personalized learning has been advocated. The disciplinary integration of Science, Technology, Engineering, and Mathematics (STE(A)M) education includes, in certain cases, the Arts [2].

Calling this new dimension-represented by the "A"-the integration of the arts with STEM education, educators have combined the two fields. Since engineering design heavily relies on art, art has been integrated into the STEM curriculum. The definition of STEAM is the integration of liberal humanities and art should get to work integrating STEAM courses right once rather than waiting for more research findings. (Tabassum, 2023).
STEAM is crucial for the development of a variety of 21st-century skills, including the following:

• Adaptability skills.
• Communication skills.
• Social skills.
• Problem-solving skills.
• Creative skills.
• Self-control.
• Scientific thinking.
• Co-operation skills.
• Curiosity and imagination

1.1 STEAM Foundation

The goal of the global 501(c)(3) nonprofit organization The Steam Foundation is to enable all K–12 students to participate in experiential STEAM education. The following topics are included in every curriculum we create: In science, technology, engineering, arts and mathematics. SEAM camp provides such that Students will learn about various facets of STEAM education and its fundamentals through our STEAM Camps program. When choosing a subject to concentrate on, students have a lot of possibilities. Every Steam Camp is a 10-week term consisting of two-hour weekly camps with other students and professors virtually. Our virtual Steam Camps allow participants to participate from anywhere in the world, which is one of its greatest features. The mission of our outreach program is to focus more on giving back to the community by helping spread STEAM Education to as many schools as possible. In the outreach program, we reach out to schools in different areas and offer equipment, materials, curriculum, and training to kickstart their programs that would be based on one of the same focus areas that we offer with our Steam Camps.

THE STEAM Foundation offers many more choices to investigate as well:
• STEAM CAMPS
• D printing
• Robotics
• Python Programming
• Java Programming
• Graphic Design
• App development
• Game development
• OUTREACH PROGRAM

1.2 Opportunities of Steam Education in India

Opportunities show the extent to which anybody may be included in the fields of industrial activity, ICT work, science, and maths that are appropriate for start-ups and employment.
Opportunities are as follows:
• course attitude and scientific skills development.
• Job opportunities increase.
• Students teaching learning can be boosted up such that connect themselves in a data-driven world.
• Different types of skills development.
• Gives a pathway to becoming a technology leader.
• Crystal's clear and basic understanding of concepts related to STEM and other streams also.
• Encourage, develop, and implement exciting mentor-based programs that inculcate interest in science and technology to apply in various fields.
• Inspiring them to meet the challenges of the global technology-driven society through innovation, collaboration, and creative problem-solving.
• Fun, engaging, and informative.
• App development, game software,3D designs etc.

1.3 Challenges in Steam Education in India

Challenges signify that what are the obstacles in achieving the target stem education-related goals.
The challenges are as follows:
• Lack of awareness about stem education.
• Lack of expertise.
• Implementation problem.
• Decoding problem.
• Lack of integrated approach in teaching-learning.
• Lack of training and seminars.

1.4 Present Status of Steam Education in India

In January 2022, there were encouraging developments in India's STEAM (science, technology, engineering, arts, and mathematics) education system, with a focus on advancing STEM fields and including the arts in the curriculum. But it's crucial to remember that things can change quickly in the field of education, and things might have changed since then.
The following are some of the methods that the Indian government, educational institutions, and other groups were attempting to improve STEAM education as of 2022:
• The Indian government has been implementing a number of policy initiatives to encourage STEM education. One such policy that promoted the integration of the arts and sciences in education is the National Education Policy (NEP) 2020, which placed a strong emphasis on a comprehensive and bilingual approach
• Various initiatives and programs aimed at developing students' skills were being put in place to improve their understanding of STEM courses. These courses attempted to impart practical information and hands-on learning experiences.
• Public-Private Partnerships: To improve STEAM education, cooperation between the public, commercial, and non-governmental sectors was valued. In order to finance educational programs, supply resources, and invest in infrastructure, public-private partnerships were being established.
• Digital Learning Platforms: There has been an increase in the use of technology in education along with digital learning platforms. Students nationwide were having easier access to online courses and platforms that provided STEAM-related curriculum.
• Extracurricular Activities: STEM-related extracurricular activities like scientific fairs, robotics competitions, and coding contests are becoming more and more popular in schools and colleges. Students were encouraged to use their creativity, critical thinking, and problem-solving abilities through these exercises.

1.5 Operational Definition

STEAM: This means how the concept of science is connected with Technology, Engineering, Arts and mathematics to give integrated knowledge.

Awareness: Awareness in this research means basic and general knowledge about any subject.

University Student: Science and social science students studying in university student

2. Rationale of the Study

In this digital era, students as well as teachers must be aware of how to integrate different streams of knowledge for better concept clarity. Without awareness, it's impossible to know the change happening in our country. After the pandemic its more vital to adopt technology and integrate with the basics of subjects and engineering.

For the present study the researcher has restricted the literature review from 2016-2023. The researcher is not finding a direct review on STEM awareness more so going to a different subject awareness researcher gets the idea of the actual meaning of awareness, and the studies chosen are arranged in chronological order.

Park, H., Byun, S., Sim, J., Han, H.-S., & Baek, Y. S [3]. (2016) show elementary school teachers most frequently used STEAM education in their class, followed by middle and high school teachers. Also, findings say that the majority of Korean teachers had a positive view of STEAM education and also seen that beginning teachers and female teachers tended to have a more negative view of STEAM education, compared to their experienced and male counter parts.

Studies by Malti, D. (2017) show that analyzing problem-solving skills and increased knowledge of stem skills [4]. Knowles, J. G., Kelley, T.R., &Holland, J.D. (2018) shows that Significant effects of independent variables were detected using the CLMM [5]. Sarac, H. (2018) shows that the study of the STEM educational practices on students' academic achievement was 0.442.

Widya, Rifandi, R., & Rahmi, Y.L. (2019) shows that the application of STEM education in education can also prepare workers who are experts in the fields of science, mathematics, and technology [6]. Chaudhary, M. (2020) shows that There is a positive impact of STEM programs on students' attitudes toward STEM programs [7].

Kahn, S., Agyarko, T., Lanouette, G., Lee, S., &Wiredu, C. (2021) shows that accessibility improves not only the real-time experiences of students but the accessibility of science at higher levels as well. Abdioglu, C., Cevik, M., &Kosar, H. (2021) shows that a high level of STEM understanding thought that the STEM approach had a greater positive impact on the students and the lesson/teaching [9]. Cetin, A. (2021) shows that the relationship between the STEM Awareness and Questioning Skills of Pre-Service Teachers is positive [10]. Kazu, I. Y. & Yalcin, C. K. (2021) shows that STEM education had a significant impact on pupils' academic progress [11]. Acar, D.& Buyuksahin, Y. (2021) shows that revealed that teachers' understanding of STEM has improved by completing the in-service training [12].

Nurul, S., Efwinda, S., & Putra, P. D. A. (2022) Teachers demonstrated clear agreement with STEM teaching and implementation strategies [13]. Kratika (2022) shows that Awareness and attitude of elementary schools towards STEM education are highly positively correlated. Hite, R.L., &Spott, J.L. (2022) show an interpretive case study sought to explore how girl-focused STEM outreach programs when infused with specific elements to enhance STEM perceptions [14]. Mustafa S. T., Ayse, C., & Jaimie, A. F. (2022) show that most pre-service early childhood teachers successfully prepared and implemented STEM-integrated lesson plans. Weyer, M., & Dell'Erba, M. (2022) shows that as STEM jobs expected to increase by 11 percent from 2020to 2030 and improving P-5 STEAM education can gurantee our countrys economic prosperity and global Competitiveness [15]. Li, K. C., & Wong, B.T.M. (2023) show that studies only examined one STE(A)M subject, it is necessary to do further research on multidisciplinary and integrative methods for STE(A) M learning [2]. Xu, L.& Fang, S.C., &Hobbs, L. (2023) shows emphasize the relevance of STEM and highlight the potential usefulness and applicability of STEM when it is integrated into formal education [16]. Llma, A.Z., Wilujeng, L. et al. (2023) shows that STEM education is the most widely applied in the science subjects to develop critical thinking skills, and scientific literacy to facilitate more skills in 21st century learning. Zhan, Z., Yao, X., & Li, T. (2023) show remote association intervention worked better to help students to achieve higher degree of creative thinking and close association intervention was more effective [17]. Tabassum, F.&Kalimullah, M.(2023) Findings of the research shows that science teachers is more aware than the Prospective Mathematics Teachers. The above study was done mostly on college going and university going students on the STEAM impact and Attitude towards STEAM and all the concern reached done mainly in Foreign .Researcher got one Indian article which is most supporting to the above research topic not fully but in similar one but no study found on STEAM awareness of University Students in the field of science and social science in Gujarat state.so researcher decided to do research on the topic STEAM Awareness among University Students specifically in the stream of Science and social science.

3. Objective

To compare mean scores of awareness of STEAM among University students of science and social science.

4. Hypothesis

There is no significant difference between mean scores of STEAM awareness among university students of science and social science students.

5. Methodology

5.1 Population and Sample

The present study was Survey in nature and was conducted in University of Gujarat States. From the list of universities random sampling technique used to specify the university (kadi Sarva Vidyalaya Gandhinagar, science college Gandhinagar, central University of Gujarat) from where data to be collected. Total 141 data collected through online as well as offline in which 71 from science streams and 70 from social science.

5.2 Research Design

Cross-sectional survey research Design will be used for the study

5.3 Tools for the Study

The researcher has used a self-developed tool for the study. Dimensions of the tools will be as follows:General Knowledge about STEAM Education. Stakeholders, and Curricular Aspects.

5.4 Data Collection

At first consent of conducting the research was taken from the head of the university of the concerned department. I get permission from respected university head of the concerned department data collected in both offline and online mode (google form) and data collected from online and offline list made in Excel sheets.

5.5 Data Analysis

For objective, to compare mean scores of STEAM Awareness among university students of science and social science students it was used independent sample 't' test.

5.6 Result and Interpretation

The objective of the study was to study the awareness of STEAM among University Students of Science and Social science students only. For analysis of data related of the objective, an independent sample t-test used by researcher as result shown below in table 01. Independent Sample t-test showing source Leven's Test for Equality of Variances (F, Significance value) t-test for Equality of Means (t value, degree of freedom(df) significance. (2-tailed))

	Levene's Test for Equality of Variances		**t-test for Equality of Means**		
	F	Sig.	t	df	Sig. (2-tailed)
Awareness of STEAM among University Students in Gujarat	**Equal variances assumed**	1.138	.288	1.111	139	.268*

*** Not significant**

Table 1: Summary of Independent sample 't' test

It can be observed that Leven's Test for Equality of Variances (F=1.138, p= 0.288 >0.05) which are not significant. Hence, the Hypothesis chosen for no significant difference in the Awareness of STEAM among University students of Science and Social Science is not rejected. The null hypothesis that there is no significant difference in awareness of STEAM among University students of science and social science is not rejected because the value of 't' for Awareness of STEAM among University Students in Gujarat is 1.110 (df=139, p=0.268>0.05) not significant at a 0.05 level of significance. So, the researcher can conclude here that the Awareness of STEAM among University of students of science and mathematics are same.

Awareness of STEAM among University Students in Gujarat	N	MEAN
SCIENCE	71	13.85
SOCIAL SCIENCE	70	12.98

Table 2: Comparison Between Means of Awareness of Steam Among University Students of Science and Mathematics

From the above table 02, it is clear that the mean score of science students is 13.85 and the mean of the social science students is 12.98, which indicates no significant difference between the mean scores of science and social science stream students.

The possible reason behind those results may be due to the Digital era and everyone in this digital age is very aware of the integrated knowledge of science, technology, engineering, arts and mathematics. Maybe researchers did not find any significant difference between science and social science students due to the above reason.

6. Conclusion

The result clearly shows that there is no significant difference between mean scores of science and social science stream students. Mean score of science students is 13.85 and the mean score of the social science students is 12.98.so from above data analysis it can be concluded that the STEAM awareness among university students of science and social science have not much significant difference means both the stream equally aware about STEAM (science, technology, engineering, arts, mathematics).

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