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WHY STEAM EDUCATION IS IMPORTANT IN TEACHING – LEARNING PRACTICES FOR FUTURE - READY CLASSROOMS?

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Abstract:

STEAM education helps to build confidence in learners and sensitize problems to facing future challenges by own. It equips students with vital skills such as innovation, problem-solving, and adaptability, addressing technological advancements and job market demands with art integration. Arts included, ranging from visual arts, language arts and physical arts to music and more which provide holistic development to students and innovative educational approaches that align with 21st century demands.

Objectives of the study: To study the Importance of STEAM education, to assess basic knowledge and examine the relationship between exposure to the arts and performance in STEAM subjects like science and mathematics and implementation of a STEAM Education teaching learning activities by art integrated learning with science and mathematics subjects in relation to study the academic achievement of students of grade 6. Method: Online survey to collect information on STEAM education, questionnaire was used to survey and examine the knowledge about of arts and performs in math's and science Experimental Method to implementation and results.

Result: STEAM education helps to build confidence, enhances the creativity, problem solving and critical thinking among the students and increases higher grades in maths and science.

Keywords: *STEAM Education, art integration, 21st century skills, holistic development.*

Introduction:

STEAM stands for science, technology, engineering, arts and mathematics. The difference is that arts are included, ranging from visual arts, language arts and physical arts to music and more. STEAM focuses on sparking imagination and creativity through the arts in ways that naturally align with STEM learning. STEAM programs can include any of the visual or performing arts, such as dance, design, painting, photography and writing.

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Area of The Research:

Education is the area which help us to achieve the goals and enhance the ability to learn the new things with the innovative way. All experts, scholars, educators and educationalist where work hard to develop the quality education system throughout the world.

"Education is simply the soul of a society as it passes from one generation to another." (G.K Chesterton) and "Education is the most powerful weapon we can use to change the world." (Nelson Mandela)

Theoretical and Conceptual Background of Steam Education:

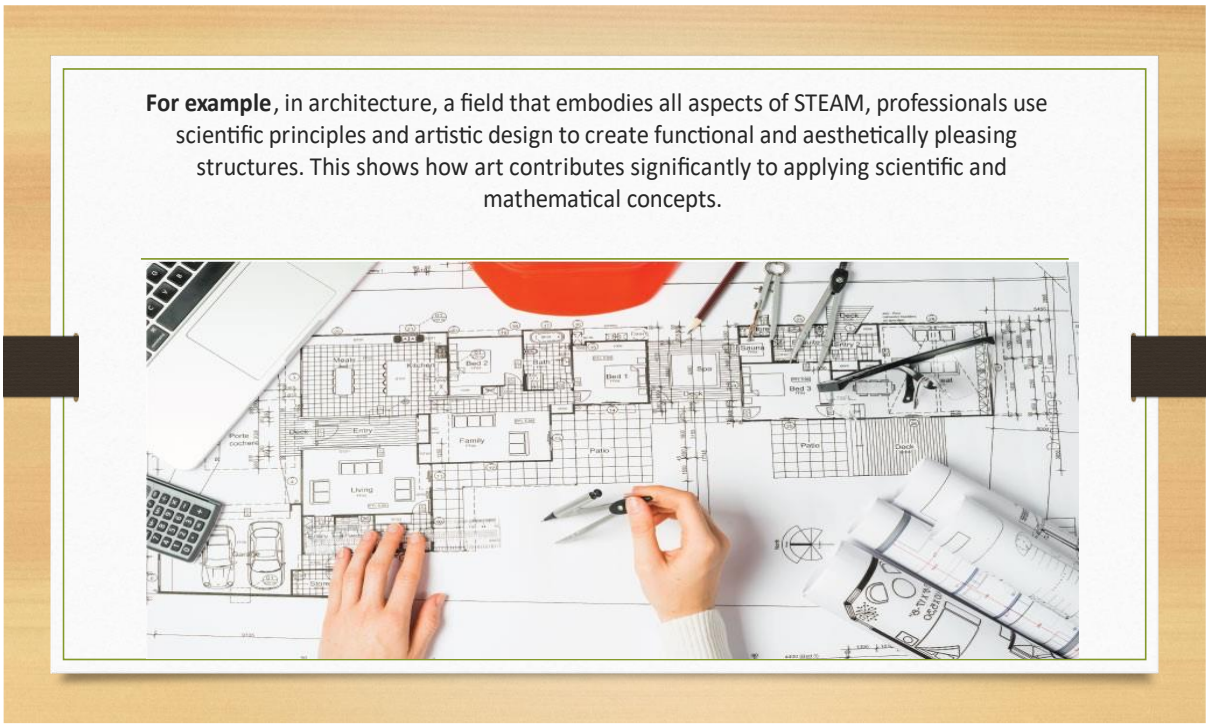
In the 21st century, economies are in growing need for individuals who are capable of innovation within their fields and, in addition to their expertise within their fields, possess knowledge and skills across different fields such as Math, Science, Engineering, and Technology (Yildirim, 2016).

Challenges of 21st Century:

STEAM education is thought to be the perfect solution for rising in a world powered by global awareness (Bakırcı & Karışan, 2017). Integrating these five knowledge disciplines is a necessity in order to bridge the gap between education system and job requirements in the 21st century.

STEAM education, an interdisciplinary approach that integrates Science, Technology, Engineering, Arts, and Mathematics, emerges as a transformative model to nurture the problem-solvers, critical thinkers, and innovators of tomorrow.

Examples of Science and mathematics activites conducted in class:



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Key Five Point of STEAM

Science: STEAM education emphasizes scientific inquiry, encouraging students to explore the natural world through observation, experimentation, and analysis. This scientific approach fosters curiosity and a deeper understanding of the world around them.

Technology: Integrating technology into STEAM education empowers students to leverage digital tools for problem-solving and creative expression. Exposure to technology prepares them for a tech-driven future and encourages responsible digital citizenship.

Engineering: Engineering design principles teach students to identify problems, develop solutions, and illiterate through the design process. This hands-on approach fosters innovation and resilience in the face of challenges.

Arts: Incorporating arts into STEAM education nurtures creativity, imagination, and self-expression. Visual arts, music, and performance arts complement analytical thinking, fostering well-rounded individuals.

Mathematics: Mathematics serves as the backbone of STEAM education, providing the essential language and tools for problem-solving, data analysis, and quantitative reasoning

Figure 1: Key Five Point of STEAM

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Benefits of STEAM Education:

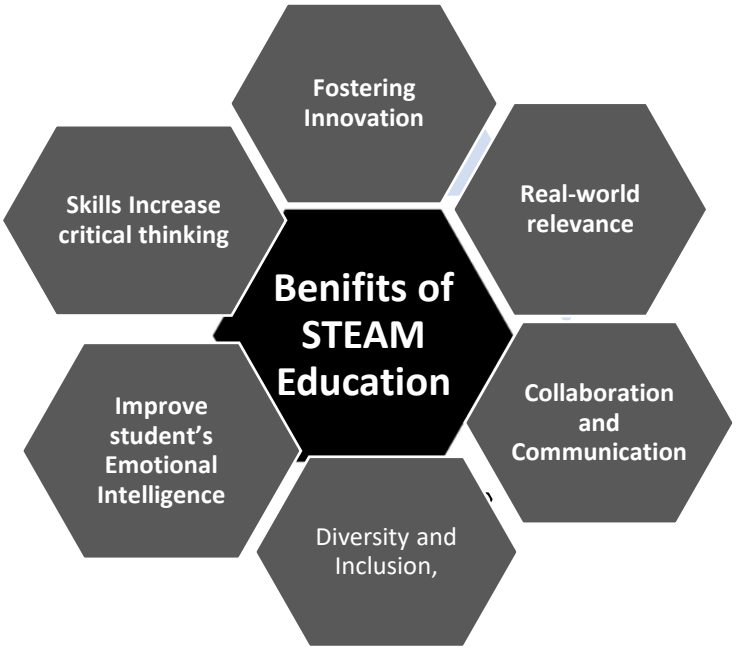

Figure 2: Benefits of STEAM Education

Art integration: Cross curricular approach to teaching and learning based on collaboration between teaching of subjects with arts. Art integration important to: Art Based enquiry, Experiential learning makes pedagogical process joyful, Multidisciplinary (links subjects to real life) Cross Curriculum Art Integration: Research on effects of cross- curriculum strategies and arts on students learning can better prepare a classroom of lifelong learners by increasing their organization movement, technological use and ability to make the globalized connection needed to better understanding modern age (Meagher, 2016)

STEAM education teaching learning introduces a new trend, in education after **NEP2020** and **NCF2022** focus on holistic development of individual teaching learning must be joyful learning.

New Education Policy 2023 focuses on holistic development and quality education to all children's. **NEP 2023 goals and key skills** are to develop creativity, critical thinking, problem-solving, communication skills, and vocational skills, and promote lifelong learning. These new upcoming NEP 2023 goals and challenges of key skills encourages researcher for the further study.

Statement of the Problem

To study the importance of steam education, assess basic knowledge and examine the relationship between exposure to the arts and performance in steam subjects. And implementation of steam education teaching learning activities by art integrated learning with science and mathematics subject achievement for **grade 6 for PDEA'S Sharadabai Pawar English Medium School, Kharadi Pune.**

Objectives of the Study:

1. To study the Importance of **STEAM** education.
2. To assess basic knowledge and examine the

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relationship between exposure to the arts and performance in **STEAM** subjects like science and mathematics.

3. To implement a **STEAM** Education teaching learning activities by art integrated learning with science and mathematics subjects in relation to study the achievement of students of grade 6.

Conceptual Definitions:

Art Integrated Learning (AIL) is a teaching-learning model which is based on learning 'through the arts' and 'with the arts': it is a process where art becomes the medium of teaching-learning, a key to understanding concepts within any subject of the curriculum. (https://vikaspedia.in/education/teachers-corner/tips-for-teachers/art-integrated-learning#)

Operational Definitions:

Steam Education Teaching Learning Activities:

The all activities in this are focused on holistic development through different activities like fun activities, gamification reading, discussion, projects and project video's, PPT Presentation, field trip, role play, learning by doing, laboratory activities, asking learners to use real problems, animation/ video clips/ films and documentaries

Art based activities like – (music, dance, drama, acting, story-telling, poem, skit, story writing etc.) group activities and cooperative learning, peer tutoring, student debates, game and puzzles, learning by teaching, etc.

After implementing all art - based activities in everyday classroom. The researcher recommends why steam education is important for future ready classrooms.?

"Why STEAM Education is important in teaching-learning practices in future – ready classrooms?"

Need and Importance :

Need: For Students:

1. STEAM education teaching- learning is more effective approach. It helps to develop creative thinking; decision making and create interest in learning process.

For Teachers:

1. STEAM education teaching learning will provide effective tools to science teacher for making teaching-learning effective and interesting and it's easy to handle all types of students.
2. **Educationist**: It has will provide guidelines while framing curriculum, syllabus, and teaching methods, teaching theories for different sets of students from school, colleges and universities.
3. **Education Policy Makres**: It will provide important information while reforming new education policy.
4. **Curriculum Designers:** It will provide guideline to framing new curriculum framework, new syllabus, and designing new curricula.
5. **Society**: It provides knowledge-based society. As today's students will be tomorrow's citizens must have self-confidence.

Importance:

1. The developed STEAM Education teaching-learning will be useful to provide potential carrier options (drawing, painting, performing arts like drama, dance etc.), STEAM subjects encourage students to think outside the box and fosters a more well-rounded perspective.

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2. STEAM education teaching learning will be useful to:

a) **Students:** This research study will provide holistic development of every individual. It builds self-confidence and encourages students to think out of the box.

b) **Teachers**: Teachers are the pillar of strength, and the guiding force in a student's lives. This research study will provide instructional guidelines and effective tools for teachers.

c) **Educationist**: It has wider scope while framing curriculum, syllabus, and teaching methods, teaching theories for different sets of students from school, colleges and universities.

d) **Education Policy Makers:** It will provide important information while reforming new education policy.

e) **Society**: It provides all-round development and carrier opportunities. As today's students will be tomorrow's citizen.

Assumptions:

1. Scientific Attitude may differ from student to student. (Patil. G.V., 2011)
2. (STEAM) curricula in current education to improve learning accomplishment and students' learning interest (Madani & Forawi, 2019).

Research Hypothesis:

There will be significant difference on the achievement scores and grades of students of Science and Mathematics subject after implementation of Steam Education Teaching Learning activities.

Null Hypothesis:

There will be no significant difference on the achievement scores and grades of students of Science and Mathematics subject after implementation of Steam Education Teaching Learning activities.

Grades	**Scores/Marks**	**Summestive Assessments: 1 Total No. of Students (SA1)**	**Summestive Assessments: 2 Total No. of Students (SA2)**	**Diff.bet^{n} SA2- SA1**
A1	91-100	06	12	6
A2	81-90	10	14	4
B1	71 -80	12	16	4
B2	61 -70	08	13	5
C1	51 -60	11	05	-6
C2	41–50	8	00	-8
D	31- 40	5	00	-5
	Total	**60**	**60**	

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Sampling Procedure(S) and Sample

Objective 1: To study the STEAM Education.

Data collection Tool: online resources of Steam Education and available international steam education Journals, articles, papers.

Objective 2 To assess basic knowledge and examine the relationship between exposure to the arts and performance in steam subjects like science and mathematics.

Data collection Tool: Survey method for 60 students. (Pre – Test SA1) and Post Test) (SA2) Questionnaire (survey)**Purposive sampling Technique**

Objective 3

To implement a **STEAM** Education teaching learning Activities by art integrated learning with science and mathematics subjects in relation to study the achievement of students of grade 6. (table1)

Table 1: Scores/Marks of SA1 and SA2 (Year 2024-25)

Achievement Test Scores / Marks of Summative Assessment 1 and Summative Assessment 2: Findings (SA1 and SA2) shows positive difference. (table 1)

Findings :

- Grades A1 increases by 6, A2 and B1 increases by 4, B2
- increases by 5 where as C1,C2 and D decreses by -6,-8,-5 respectivly

Results and Discussion: **STEAM** education teaching-learning activities Implemented for 6 months on grade 6. It shows positive effect on percentage and grades of learners which increases Percentage by 10 - 15 % and lifting up graph by upgrading scores and grades indictes that the significance difference in the student's academic achievement of grade 6 students achieved higher grades in academic .

Conclusion:

STEAM education equips students with vital skills such as innovation, problem-solving, and adaptability, addressing technological advancements and job market demands. Its important for students, teachers,educationist, society, educational poclicy makers, curricular designers.

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