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PROPOSAL OF STREAM INTERVENTION PROGRAMME FOR MULTILINGUAL CLASSROOM LEARNING

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ABSTRACT

Education in the modern world seeks to enhance a person's abilities in communication, decision-making, creativity, and critical thinking for the development of their total personality. In this accord, NEP 2020 also envisions holistic, flexible, and inter/multidisciplinary learning to develop human potential in all domains—intellectual, artistic, social, physical, emotional, and moral. Thus, it proposes to evolve such pedagogy that designs education to be creative, enjoyable, experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centered, discussion-based, flexible, and multidisciplinary in approach. The STREAM encourages students to participate in interdisciplinary learning and encourages instructors to use interdisciplinary thinking. Teachers may carry out interdisciplinary instruction based on the STREAM educational philosophy in an efficient manner with project-based learning, problem-based learning, or inquiry-based learning. The diversity of India is also visible in its multilingualism. The academic performance of learners is significantly influenced by the medium of instruction, and a lot of research has been done in this area globally. Teachers as well as learners face lots of challenges in the teaching-learning process in a multilingual setup. Additionally, adopting the English language as a medium of instruction prevents students from fully gaining the information, abilities, and attitudes needed for their academic pursuits. The advanced learning approach known as STREAM education has the potential to transform Indian education completely. This paper seeks to understand how STREAM can be helpful for the teaching-learning process in the multilingual classroom and also proposes an intervention programme based on its philosophy to guide teachers and educators to use it in the multilingual classroom setup.

Keywords: STREAM, Project-based Learning, Multilingual Learning.

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1. Introduction

In 2001, the US government formally created the term STEM. STEM is the integration of Science Technology, Engineering, and Mathematics to improve the higher-order thinking skills (Rifandi & Rahmi, 2019; Sanders et al., 2011) and the performance of their learners in PISA. Later the number of learners enrolled in STEM education started to decrease. The reason was found that there is a lack of creativity in teaching teaching-learning process. Therefore, learners started to lose interest in STEM education. The idea that STEM should be merged with the letter 'A' to become STEAM has gained traction in the last several years (Aguilera & Revilla, 2021). Here 'A' refers to Arts that introduce creativity in the teaching-learning Process. According to Spector (2015) (p. 5), STEAM education may be described as "the inclusion of arts and humanities in STEM education." When STEM students learn via creating art, their creativity is enhanced, their views are expanded, and they uncover previously undiscovered abilities. One way to make the learners solve problems related to their education is to develop creative and collaborative abilities in them through STEAM education. The purpose of STEAM education is to encourage students to actively interact with challenges and topics connected to science, math, and related curriculum areas. To prepare pupils for global competitiveness, this learning method fosters the development of life skills including creativity, cooperation, communication, problem-solving, adaptability, and self-reliance (Liao, 2019). Preparing students to address real-world issues "through innovation, creativity, critical thinking, effective communication, collaboration, and ultimately new knowledge" (p. 410) is one of STEAM's primary objectives, according to Quigley & Herro (2016). They went on to suggest that STEAM can be used to solve any problem by utilizing the following methods: (1) project-based learning; (2) technology to some extent for creativity and design; (3) inquiry approaches, which allow for multiple paths to solve a problem; (4) Science, Technology, Engineering, Arts/Humanities, and Math as required by the problem(- based learning); and (5) collaborative problem-solving skill (as cited in Herro et al., 2019, p. 2). Without a doubt, the development of the creativity that drives innovation depends on arts education. Research suggests that learners' academic achievement and their competency in the language of instruction are related (Komba, & Bosco, 2015; Kagwesage, 2012; Mlay, 2010). Language proficiency is crucial for academic success. Further, Komba, & Bosco, (2015) emphasize the importance of language in education for effective teaching and learning as it is the foundation for learning any discipline. Therefore, learning a language is essential for education. As important as it is for learners to understand technology and problem-solving techniques, reading, writing, and arts are all essential to education. As a result, the STREAM approach is introduced. The term "STREAM" was emphasized by adding the letter "R" for reading and w(R)iting (Sun, W., & Zhong, 2024). An essential component of every educational

programme is reading and writing (Weyer & Dell'Ebra 2022). As a result, integrating these proficiencies with STEM and STEAM is crucial. Reading and Writing assist learners in mastering effective communication, which is an important aspect of social relationships. By integrating these skills into the present STEAM education system and emphasizing reading and writing as essential components of acquiring new knowledge, STREAM offers a well-rounded learning experience.

2. Intervention Programme Based on STREAM Learning Approach

The study in hand required the development of an Intervention Programme based on the STREAM Learning Approach for class VII to know its effect on Multilingual Competence at the elementary level. The Intervention Programme based on the STREAM philosophy was developed with slight modifications of a middle school English interdisciplinary project-based learning model based on the STEAM education philosophy proposed by Jiang, and Jin (2024). Jiang and Jin's model is based on the project-oriented elementary school STEAM design diagram proposed by Yuan and Wang, combined with the STEM interdisciplinary project design model proposed by Yu SQ and Hu X. There are three phases to complete the Intervention Programme in the study. The first phase is the development phase of the STREAM Learning Project, the second phase is the implementation phase and the last phase is the evaluation phase as shown in Figure 1.

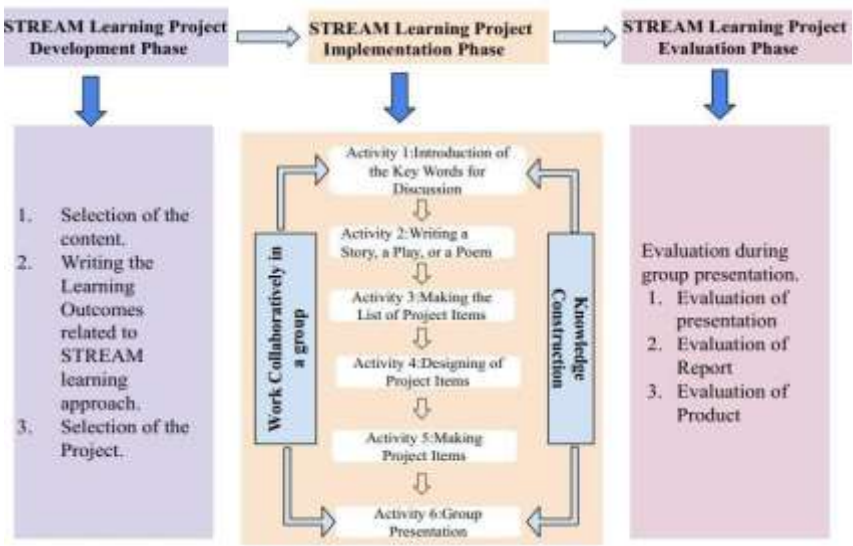


Fig. 1: STREAM Learning Approach based Intervention Programme Blueprint

2.1. Phase I: STREAM Learning Project Development Phase

In this phase, the content of the subjects for the Intervention Programme was selected accordingly. The learning objectives (learning outcomes) were written for the selected content. The researcher developed five projects in the intervention programme. One of the five projects, i.e., Model River and/or Boat Toy is mentioned below.

S.N.	Chapter Details	Subject	Project
1.	• **Stages in the development of River Valley** • **Day by Day I Float My Paper Boat** • **Energy**	Geography English Physical Science	Model River and/or Boat Toy

Table 1: Index of Content, Subject, and Finalized STREAM-based Project

2.1.1. Learning Outcomes Related to STREAM to be Achieved Through Project-1(Model River and/or Boat Toy)

S-Application and Integration of Science, English, and Geography.

- The students shall be able to learn in detail the concepts of the development of River Valley.
- The students shall be able to learn in detail the concepts of River Valley Development at a different speed.
- The students shall be able to learn in detail the concepts of the use of Energy and its changes in floating of Boats.
- The students shall be able to learn in detail the English chapter Day by Day I Float My Paper Boats.

T-Application of Technology

- The students shall be able to construct the basic knowledge of using project production tools and technology.
- The students shall be able to get help from technologies like computers, laptops, mobile, the internet, etc., and websites like Google, YouTube, etc. in exploring Model River and/or Boat Toy.
- The students shall be able to select the design of the Model River and/or Boat Toy with the help of technologies, internet search engines, websites, and social platforms.
- The students shall be able to make a checklist of different required items to make projects with the help of technologies, internet search engines, websites, and social platforms.

R- Application of Reading and Writing Skill

- The students shall be able to write a creative piece of poem/ story/ play using the keywords given to them.
- The students shall be able to write the detailed process involved in project formation in their project report.
- The students shall write in a collaborative way that will represent their group.
- The students shall be able to read and understand the concepts and principals involved in the making of the project.
- The students shall be able to read their creative piece of poem/ story/ play and make necessary changes if required before their presentation and submission.
- The students shall be able to read their project report and make necessary changes if required before their presentation and submission.

E -Application of Engineering

- The students shall be able to explain the Engineering design process used in making projects.
- The students shall be able to apply the Engineering design process to make, test, and modify the design if required.

A- Application of Arts

- The students shall be able to decorate their projects with different colors and designs.
- The students shall be able to use esthetics while designing the project items.
- The students shall be able to use their creativity while making the projects.

M-Application of Mathematics

- The students shall be able to apply Mathematics like angle, length, height, area, etc. while making the project and its draft.
- Measure the width of the riverbeds
- Create a table to record the measurements for each set of experiments.

2.2. Phase II: STREAM Learning Project Implementation Phase

Different activities were designed to complete this project. The list of these activities is given below in Table 2.

S.N.	List of Activities for Project 1(Model River and/or Boat Toy)
Activity 1.1	Introduction of the Keywords for Discussion
Activity 1.2	Writing a Story, a Play, or a Poem
Activity 1.3	Making the List of Items Required to Make Model River and/or Boat Toy
Activity 1.4	Designing of Model River and/or Boat Toy
Activity 1.5	Making of Model River and/or Boat Toy
Activity 1.6	Group Presentation

Table 2: Index of Activities in STREAM-based Project-1 (Model River and/or Boat Toy)

These activities were planned to achieve the goal of the project. The activities that learners would perform were explained. While explaining the activities, the learning outcomes were also told to learners that would be achieved through the activity as well as guidelines for each activity that needs to be followed by learners. These details are explained below:

Activity 1.1-Introduction of Keywords for Discussion

In the first activity researcher shall give keywords to learners for discussion in their peer group. He/She shall ask the groups to discuss with their peer members and decide whether they want to write a story, a play, or a poem with the help of keywords. The researcher shall ask the four members of the group to write the same creative writing in a chosen language between Hindi, English, Bengali, and Santhali.

Keywords for creative writing: Sand, River, Boat, Pebbles, Friends

Activity 1.2-Writing a Story, a Play, or a Poem

In the second activity, learners shall share their ideas, thoughts, and views on the given keywords with their peer members. They shall work collaboratively on writing a story, play, or poem. They shall also give a proper title to their creative piece of writing.

Activity 1.3 -Making the List of Items Required to Make Model River and/or Boat Toy

In the third activity learners shall explore different search engines, i.e., Google, Yahoo, and social media platforms like YouTube, Facebook, Twitter, etc. for easy-to-make Model River and/or Boat Toys. They shall discuss collaboratively the affordability and easiness of the process of making the Model River and/or Boat Toy. Based on their conclusion, they will prepare a list of items and steps required to make a Model River and/or Boat Toy.

Activity 1.4 -Designing of Model River and/or Boat Toy

In the fourth activity, group members shall discuss thoroughly among themselves and assign different tasks to the group members.

The group members will then perform their assigned tasks. Some members shall explore the internet and different platforms for different designs of the Model River and/or Boat Toy and finalize the design for the same. Some explore the same to make a list of required materials to make the Model River and/or Boat Toy. After posing the ideas and different suggestions, they will discuss them thoroughly and finalize the list of required materials. The group members shall work collaboratively in completing the activity.

Activity 1.5 -Making Model River and/or Boat Toy

In the fifth activity, group members shall discuss thoroughly and make a list of tasks that need to be done to make the Model River and/or Boat Toy. They will assign different tasks to group members. Each member shall have to arrange the required material assigned to them. After the collection of the required materials, the members will make the part of the Model River and/or Boat Toy they were assigned and then collaboratively combine the parts of the Model River and/or Boat Toy. They will then check the workability of the Model River and/or Boat Toy. Each group will use the Engineering design process where learners design, build, and test their Model River and/or Boat Toy and make necessary changes if required. Therefore, if needed, they will make the required changes and redesign, rebuild, and retest their Model River and/or Boat Toy.

Activity 1.6 -Group Presentation

In this activity, each group shall give their presentation before the class. During the presentation, they shall present their Model River and/or Boat Toy and explain the process of making it. During the presentation, a thorough discussion will take place based on the concepts on which Model River and/or Boat Toy.

Brainstorming Questions

- What function do rivers have in the water cycle?
- How do rivers shape the land?
- What major processes take place?
- What are the Stages in the development of River Valley?
- What happens when you inflate the balloon or twist up the rubber band? What type of energy is stored in it?
- What happens when you release the balloon/rubber band?
- Why does the boat move forward? What type of energy is the potential energy converted to?
- What happens to the balloon's/boat's kinetic energy? Why does the boat slow down? Why doesn't the car/boat keep moving forever?
- Explain the conservation and conversion of energy.

2.3. Phase III: STREAM Learning Project Evaluation Phase

The project evaluation phase is a crucial step in determining the achievement of project goals. In the project evaluation phase, the evaluation shall be done on the following points with the help of rubrics made for evaluation:

- Group presentation.
- Evaluation of presentation
- Evaluation of Report
- Evaluation of Product

3. Conclusion

Nevertheless, it is impressive to observe how everyone worldwide is embracing STEM, STEAM, and STREAM with a good attitude and a wide viewpoint. The 21st-century skills of collaboration, communication, creativity, critical thinking, and problem-solving would all be fostered by these teaching methods. Students are encouraged to be creative and innovative while still acquiring critical academic and life skills in a STREAM learning approach, It applies a multidisciplinary/interdisciplinary approach that integrates science, technology, engineering, the arts, and mathematics with reading and writing skills-based activities. To equip themselves for this method of teaching, educators also require the appropriate level of training via various channels. This will make it possible for the instructor to include activities from the fields of science, technology, engineering, reading and writing, and mathematics into his or her teachings, promoting critical thinking, active engagement, teamwork, creativity, and the development of skills that will be crucial for the citizens of the future.

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