Transforming Physics Classrooms through Art Integrated Learning: A Survey Study

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Abstract- *Present 21st century demands the learners to apply the knowledge gained I the classrooms to solve real problems which are impossible if the students do not understand the concepts in physics. The gravity of the situation is exacerbated given the wrong pedagogies adopted in the classrooms. Such pedagogies kill the interest and creativity of the students. Henceforth, students lack a clear understanding of concepts. However, art integrated learning is a pedagogy that develops cross-cutting understanding, makes learning joyful and meaningful activity, and contributes to social and emotional development of the students. So a study was conducted to design an activity to teach physics through arts and to study the students' perspectives about art integration in physics. Henceforth, a descriptive survey research method was used to conduct the present study. A CBSE board school was selected conveniently from which 60 science stream higher secondary students were selected randomly from Lucknow City. A Likert-type scale was used to collect data. The results reveal that students liked the activities, found them engaging, motivating, and relevant to physics teaching. Some even regarded them to be waste of time. Additionally, the students also urged the need for the teacher's wisdom in designing and planning these activities as the teacher is the facilitator of the whole learning process in teaching through arts. This study may motivate the teachers to use this pedagogy as frequently as possible.*

Keywords**:** Art integrated learning, Physics, Perspectives, Cross-cutting, Joyful learning, Meaningful learning.

Introduction

The 21st century demands physics learners to be active participants in their learning process. So rote learning, cramming the concepts will not make them good problem-solvers, creative thinkers, and collaborators. Besides rote learning kills interest in learning physics among the students and students consider it to be difficult and abstract (Oon and Subramaniam, 2011). Art integrated learning is a cross-curricular pedagogy that caters to all the domains of the students, making the classroom environment joyful and rich in experiences. This provides ample opportunities for hands-on activities for the students. Various forms of arts-visual arts like

drawing, painting, modeling, or performing like dance, music, theatre, or puppet shows can be used appropriately in learning by the students as per their interest and knowledge of arts, its standards, and rules of usage. In this context, **Silverstein, and Layne (2020) of** the Kennedy Center defines art integration as *"Arts Integration is an* **approach** *to* **teaching** *in which students construct and demonstrate* **understanding** *through an art form. Students engage in a* **creative process** *which* **connects** *an art form and another subject area and meets* **evolving objectives in both***."* Subsequently, this pedagogy favors the development of the whole child as it provides emotional safety, full engagement of the child in learning. Moreover, arts offer wholeness to learning by integrating thoughts, feelings, and action. Further, it helps in the long-term retention of the content (Rinne, Gregory, Yarmolinskaya, and Hardiman, 2011; Hardiman, Rinne, and Yarmolinskaya, 2014) which is the first and foremost thing for the content to be applied in daily life. Even more, art integration is linked with increased student engagement and enhanced student social-emotional skills (Steele, 2016). It addresses multiple intelligences of the students, develops 21st century skills, develops the whole child, encourages differentiated instruction, builds literacy skills across the curricula, and encourages culturally relevant curricula. Hence, a study was conducted to plan an activity to integrate art in physics and to study students' perspectives towards such integration.

Objectives

1. To design an activity to teach physics through art integration.
2. To study students' perspectives about art integration in physics.

Methodology

A descriptive research method was used in the study. The first section dealt with designing an activity to show art integration in physics. In the latter section, a survey was conducted in Lucknow city on 60 students of class 11th of the CBSE board who were taught physics through arts-integrated pedagogy for 10 days. During these ten days, various art activities were integrated with physics topics with the materials/objects easily available at home. Based on these activities performed with the students, a survey was conducted to know students' perspectives in learning physics through arts. The school was selected conveniently while the students were selected randomly. For knowing the students' perspectives towards art integration in physics, a Likert-

type scale was developed that had seven positive items and two negative items. Here the study is delimited to the higher secondary stage only.

Results and discussion

To plan an art integrated activity in physics

The following activity was carried out with the students.

Materials required	5 toothpicks, water in a glass, a plate, and a dropper
Procedure	Take 5 toothpicks and bend them in the middle. Make sure they don't break. Then place them in such a way that they form a floral pattern on a plate as shown in Fig. 1. You will see a small circle in the middle of the pattern. Take a small quantity of water in the dropper and put one or two drops in the circle of the floral design. Observe. What do you see? You will see that the floral design slowly takes the shape of a star. Why is it so?
Explanation	It is due to surface tension.

Fig. 1 Arrangement of toothpicks and floral pattern due to drops of water

To study the perspectives of the students taught physics through art integrated learning

For the second objective, a Likert-type scale was designed for the students and was given to 60 students of class 11^{th} taught physics through art integration. The results of this have been represented in Table 1 below:

Table 1 Studies the perspectives of the students studying physics through art integrated learning (expressed in %).

Statements	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
I like this method of teaching physics.	48.1	33.9	5.6	9.9	2.5
I find the activities very interesting.	40.7	48.0	1.9	6.9	2.5
I learn physics my way through this method.	52.1	29.9	1.6	7.1	9.3
I find art integrated learning physics very motivating.	39.8	50.5	3.8	4.0	1.9
I find the activities very engaging.	31.7	49.9	6.6	7.4	4.4
Learning physics through art integrated learning is quite a time-consuming method.	25.2	24.0	2.8	23.6	24.4
I lose concentration during the activities of art integrated learning in physics.	19.8	22.6	7.8	26.4	23.4
I find the activities of the art integrated learning in physics irrelevant.	10.1	9.2	4.7	40.5	35.5
My physics teacher designs appropriate activities for learning physics through art integrated learning.	41.3	37.6	3.6	8.1	9.4

The responses of the respondents reveal that 82% liked art integrated learning and 88.7% liked the activities. Moreover, 82% of the students were happy that they can learn physics in their ways through this method in this method students are encouraged to use their talents of arts be it visual or performing to understand physics phenomena similar to studies. Meanwhile, a large percentage 90.3% of the students found the art integrated learning very motivating. Nevertheless, 81.6% of students confirmed the activities to be engaging. Although, interestingly 49.2% of students felt that the activities are time-consuming while 48.0% of students felt otherwise. The students might have found the activities time-consuming as a lot of time is required in designing and carrying out the activities. But that can be borne because these activities accelerate the learning of the phenomena. Even more strikingly, 42.4% viewed art integrated learning in Physics as hampers with their concentration while 49.8% had an opposite view to this. It may be because while performing the activities of art in physics, students might be more bothered about showcasing their talents rather than focusing on the purpose of learning the concepts through arts. Additionally, 76% confirmed that teaching physics through art activities is not irrelevant rather part and parcel of physics teaching since all the subjects are interrelated and no subject can be taught in isolation. 78.9% expressed that their physics teacher designs appropriate art integrated activities suited to the context for physics learning which is an important aspect because if it is not so then the sole purpose of learning through art will be lost. Therefore, the teacher must be aware of designing appropriate activities.

Conclusion

Art integrated learning is very important for physics instruction because that makes the subject even more interesting and students gain knowledge while doing hands-on activities It was found that students liked the activities, found them engaging, motivating, and relevant to physics teaching. Some even felt it is time waste but that depends on how wisely and suitably the activities are planned and executed. The students also urged the need for teacher wisdom in designing and planning these activities as the teacher is the facilitator of the whole learning process.

Implications

The study may motivate the teachers to use this pedagogy as frequently as possible to develop the social and emotional development of the students along with cognitive development. The study will also motivate researchers to research other aspects of the art integrated learning in physics. The study may also motivate the policy-making bodies to conduct faculty development programmes and training courses for the physics teachers towards art integration in physics more frequently to make learning physics enjoyable and meaningful. Further, the study may also be conducted on a larger sample besides using an experimental research method comparing art integrated learning with some other pedagogy. Additionally, the study may be conducted on other stages of education like middle levels of school education, and graduation.

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