EXPLORING THE ART RELEVANT TO SCIENCE TEACHING

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ABSTRACT
Active teachers have always been finding and striving to find different ways to make learning more interesting and effective. Ever since the time of Aristotle, drama has been used over the course of history for delivering the knowledge, where emphasis was placed upon doing rather than memorizing. The purpose of engaging these art activities to the curriculum teaching is to create a variety of opportunities for all students to participate and increase effectiveness of learning. This paper attempts to know the various forms of art that brings life in classroom teachings for better understanding of the subject.

Keywords: Art in Education, drama in science, music in science, dance in science

1. INTRODUCTION
Active teachers have always been finding and striving to find different ways to make learning more interesting and effective. Ever since the time of Aristotle, the use of various art forms have been used over the course of history for delivering the knowledge, where emphasis was placed upon “doing” rather than memorizing. Integrating drama, music, dance, drawings and such other forms of art helps children in various ways.

The National Science Educational Standards, published in 1996, emphasize the need to teach science through inquiry; and also enhance science teachers’ professional development. To achieve the goals of the scientific way of mind and scientific literacy, science teaching must change so that students will be actively involved in creating their own understanding and knowledge.

2. NEED AND IMPORTANCE OF STUDY
The National Curricular Framework 2005 (NCF) reminds us that the school curriculum must integrate various domains of knowledge, so that the curriculum encompasses all, and is not separated from the co-curricular or extra-curricular. This has significant implications for the role of art, music and drama in education, to nurture children’s creativity and aesthetic sensibilities. Learning is enhanced through the use of different forms of art in Education.
Students differ in their learning styles. A certain method may be most effective for one, but for others it does work well. For some students, auditory input is most valuable, while others rely upon a visual style. Still others learn through kinaesthetic means, or a combination of the three. Helping to meet these diverse learning needs is the goal of arts integration in the classroom.”

The Importance of Drama in Education: Drama or theatre is one of the strongest mediums of expression. Plays and theatrical activities today have gained immense importance not just in terms of entertainment, reflecting the social, cultural and political life of the people but also as an effective component in formal education. Although drama like any other art form is a complete and independent art in itself, the tools and techniques involved in the dramatic process can be incorporated to reinforce and further enhance the learning of other academic subjects.

Drama encompasses a number of educational concepts and activities. Acting, play, imagination, creativity, verbal and physical skills used in the performance of a drama, are composite forms of education which can become a part of an integrated, child – centred curriculum. Using drama as a medium to teach regular subjects is both, a challenge and a pleasure.

Drama is a teaching tool that allows students to participate, demonstrate, and observe. In other words, it provides another "non-traditional" opportunity for students to learn and to demonstrate learning. At the same time, drama helps students get in touch with their creativity and spontaneity as well as to develop confidence in the expression of their ideas. Finally, it teaches self-discipline, acceptance of and positive response to criticism, and cooperation with others.

Following are the essential points that are important to consider about drama.
1. Drama is part of real life and prepares students to deal with life’s problems.
2. Drama engages students in creative problem-solving and decision making and supports student’s problem solving skills.
3. Drama develops verbal and nonverbal communication.
4. Drama builds cooperation and develops other social skills. Working together as a group promotes, encourages and motivates cooperation.

Drama is entertaining too. Fun is learning, and learning is fun. If we remember this and try to incorporate fun in our teaching, our students will enjoy the learning process. Drama can be used as a teaching and learning tool to help students make meaning of a
number of skills they need to be as all rounded individual. Thus drama enhances the classroom environment while also building upon a child’s development.

**Importance of Dance in Education**

Dance is a kinaesthetic approach to learning. Dance is presented as a way of learning that motivates learners, increases their curiosity for exploring a concept and contributes to achievement in learning. Dance is that element of arts integration in education which helps children learn in different ways. It is an excellent blend of several forms of arts. Dance incorporates drama, music, lyrics, rhythm, facial expressions, and bodily movements and so on. It is a brilliant combination and synthesis of our ability to use all of our senses for learning and to create learning environments. Dance offers a fun way to learn science due to its following qualities.

1) Dance education appeals most to the kinaesthetic learners.
2) Dance education creates opportunities for self-expression and communication.
3) Dance education teaches the values and skills of creativity, problem solving and higher-order thinking skills.
4) The study of dance fosters an individual’s ability to better interpret interpersonal nonverbal communication.

Through stimulating all the senses, dance goes beyond verbal language and promoting the development of multisensory beings. Dance education helps students develop life skills, physical fitness, appreciation of the body, concern for sound health practices, and effective stress management approaches.

**Importance of Music in Education**

We all grow with songs and lyrics right from our birth. Songs remind us of people, places, events, good times and bad times and that bring back memories that have long been repressed or even forgotten. These songs define our lives and we all have this personal and emotional playlist that I call as “Soundtrack of Our Lives. Music is the one constant to which everyone is attached, and that everyone understands. We all can agree that, without music, life would be silent. Music plays an important role in education due to its unique features.

Total effect of lyrics, rhythm, expressions, its style of presentation, takes music to the highest level of appeal that leaves almost permanent mark on our mind. That is why we can remember song lyrics for our entire lives. If music is so near and dear to each of us and everyone listens to some form of music, we must utilize music and songs to engage our
students and enhance learning. This would help them understand specific topics and, at the same time, help them comprehend and retain that information.

Following are the important qualities of music to be considered.

1. Early musical training helps develop brain areas involved in language and reasoning. Linking familiar songs to new information can also help imprint information on young minds.

2. There is also a causal link between music and spatial intelligence that is the ability to perceive the world accurately.

3. Music study enhances teamwork skills and discipline.


More importantly music develops skills that are necessary in the workplace. It focuses on doing, as opposed to observing, and teaches students how to perform, literally, anywhere in the world. Music enable students to better communicate and to cooperate with one another.

**The Importance of Art in Education**

The art and science are intimately related. There is science in every artistic creation and in every scientific phenomenon there lies some art. For example, a catchy painting has in it many scientific concepts as similarity, congruence, proportion, size, shape and a suitable mixing of all of it. Musical scales demonstrate mathematical relationships, and child's kaleidoscope displays geometric principles. We are surrounded by various art forms in nature. We are proud Indians to have rich and varied artistic culture. We have ancient traditional treasure of drawings, paintings sculptures, and paper art and so on. However we often fail to identify various art forms in our surrounding nature, in plants, animals, soil, farms, forests, hills, rivers, mountains the list is long. We need to make conscious attempt to identify it.

There are many ways to employ visual art in the science classroom. Art-based activities can help students comprehend abstract scientific theories and improve their critical thinking skills. Through the manipulation of images and materials, these activities can also address deficits in sequencing and visual-spatial relationships.

When using their skills of observation, students begin to identify the parts and its functioning, then apply the appropriate scientific principles to explain how. The idea of patterns in nature can be supported by analyzing a painting. While working on a unit on light, students learn the similarities between the eye and a traditional camera, how light works, how film works, and how light reacts with film. Collages are a means for students to gather and assemble images
that represent an idea. While murals can be a large undertaking, they include many levels of learning, from deductive and inductive reasoning skills.

In view of the above qualities of art, following problem is chosen for the study.

3. STATEMENT OF THE PROBLEM
To explore the form of art that is most relevant for science teaching.

4. OPERATIONAL DEFINITIONS OF IMPORTANT TERMS
The following are the important terms used in the study-

The form of art—any art form such as drama, dance, music and art (such as drawings-paintings, pictures or such graphical presentations)

Relevant teaching method – any of the various forms of drama, dance, music and art that can be employed for regular classroom instructions.

5. OBJECTIVES OF THE STUDY
1. To identify the suitable topics for employing art as teaching method in science subject.
2. To analyse the content into its sub-units to assist in selecting suitable art form.
3. To identify the form of art that can be used most effectively for classroom teaching.

6. LIMITATIONS
1. The study is limited to the responses of the questionnaire prepared by the researcher.
2. The responses are collected from the teacher trainees of second year B.Ed. course of Pune University
3. Topic selection is made on the basis of opinions of the experienced teachers teaching 7th standard science.
4. The study is limited to selected topics of 7th standard science prescribed by Maharashtra State Board of Curriculum Research.

7. METHOD

Method of research
Objective-1 In view of teachers’ opinion is taken to select the lessons from science text.

Objective-2 Content is analysed into its sub-units to assist the selection of appropriate form of art. Objective -3 Survey method is used to collect the data for the study.

Sample
The sample for this study comprises of 30 trainee teachers of second year B.Ed. course of Pune University, Pune. The rationale behind selecting Second year trainee students is that, they have studied the different teaching methods and acquired them in 1st year.
Tool
Selection of the topics for survey was done by the opinion of ten Experienced teachers. The questionnaire for the survey was developed by the researcher for these selected units.

8. FINDINGS AND OBSERVATIONS
The responses were analysed and findings are shown in Table-1

Table-1: Responses of trainee teachers of 2nd year B.Ed. course

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Units</th>
<th>Sub Units</th>
<th>Drama</th>
<th>Music</th>
<th>Dance</th>
<th>Art</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Propagation of light</td>
<td>Propagation of light, Transmission of light, Eclipses, Colors, formation of shadow, colours in the sunlight, light required for growth of plants</td>
<td>9</td>
<td>2</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>Reproduction of living things</td>
<td>Reproduction in plants(asexual, sexual, vegetative) perpetuation of species</td>
<td>9</td>
<td>2</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Sound</td>
<td>Production of sound, propagation of sound, Vibrations, Reflection of sound, Speed of sound</td>
<td>5</td>
<td>20</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>Electricity</td>
<td>Electric charge, Static electricity, Transfer and induction of electric charge, electroscope</td>
<td>3</td>
<td>9</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Organization of living things</td>
<td>Organization at Cell level, Tissue level, Organ level, System level</td>
<td>10</td>
<td>6</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Control and coordination in human body</td>
<td>Nervous system, Afferent nerves, Efferent nerves, Reflex action, Endocrine system, Growth in animals</td>
<td>9</td>
<td>0</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td>7</td>
<td>Transmission of heat</td>
<td>Conduction, Convection and Radiation of heat, Functions of thermos flask, Good and Bad conductors of heat</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>8</td>
<td>Effects of heat</td>
<td>Expansion and contraction, Bimetallic strip, Expansion of liquid, Expansion of gases</td>
<td>10</td>
<td>5</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td>Food and nutrition</td>
<td>Concept of nutrition, modes of taking food, digestive system, Food related needs of plant, osmosis</td>
<td>10</td>
<td>6</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>Health and diseases</td>
<td>Vitamin deficiency, Diseases caused by deficiency of vitamin C and D, Deficiency of Calcium, Phosphorous, Iron, Iodine</td>
<td>13</td>
<td>7</td>
<td>2</td>
<td>8</td>
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<tr>
<td></td>
<td>Total</td>
<td></td>
<td>83</td>
<td>61</td>
<td>57</td>
<td>99</td>
</tr>
</tbody>
</table>
9. FINDINGS AND CONCLUSIONS

Related to drama
87.7% of trainee teachers have favourable opinion for using drama as teaching method.

Related to Music
80.3% of trainee teachers have favourable opinion for using music as teaching method.

Related to Dance
19% of trainee teachers have opined favourably for using dance.

Related to Art such as Drawing, Painting, and Pictures etc.
4)33% of trainee teachers are favourable for using art in classroom teaching.

Most of the trainees have experienced drama at some point, so majority of the trainees are positive at using it in classrooms while teaching science. As we all grow with music, right from our birth, music is closer to most of the trainees, hence most of trainees prefer to use music. Even though most of the teachers have not been exposed to dance ever before, as much as 19% of trainee teachers have opined favourably for dance as they want to experience the novelty. Students have been using some form of graphic art as their teaching-aids, they are at ease while using charts, pictures, paintings etc.

10. DISCUSSION
Art and science are intrinsically linked; the essence of art and science is discovery. Both artists and scientists work in a systematic but creative way. Knowledge and understanding are built up through pieces of art or a series of lab experiments. In the classroom, integrating science and visual art can provide students with the latitude to think, discover, and make connections. Integrating visual art and science is a way to meet the needs of all students. The basic approach of using art-based activities is to help students understand scientific theories.
Arts, dance, music, puppetry, storytelling and other mediums – engage students who are not otherwise being reached. To reach diverse audiences of learners, teachers must differentiate and diversify their own teaching styles. How students characterize their learning style and with which framework they characterize it contributes to their academic success.

The use of learning strategies that work for their learning style is important. An instructor's teaching style should provide access for students with different learning styles during science course. The components of fine arts aim to develop aesthetic sensibilities in students. Developing life skills for facing life challenges is another long term goal of education. Different art forms build trust and cooperation, the sense of responsibility, pursuing tasks collectively and exploring varied perspectives. Be it visual or performing, the practice of art deepens children’s ability for perception, reflection and expression.

Drama encompasses a number of educational concepts and activities. Acting, play, imagination, creativity, verbal and physical skills used in the performance of a drama, dance, music or any form of art can become a part of an integrated, child – centered curriculum. Art is a teaching tool that allows students to participate, demonstrate, and observe. In other words, it provides another non-traditional opportunity for students to learn and to demonstrate learning. Any form of art helps students get in touch with their creativity and spontaneity as well as to develop confidence in the expression. Finally, it teaches self-discipline, acceptance of and positive response to criticism, and cooperation with others. Using any form of art as a medium to teach regular subjects is both, a challenge and a pleasure. Teachers must welcome such a challenge and derive pleasure in teaching-learning process.

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