

## **Art integrated Mathematics Pedagogy: Possibilities and Challenges**

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### **Abstract**

Art being the creative expression of human being now integrated in the education system with multifaceted objectives to make learning interesting and to make learning process proactive, interactive, participatory and more effective in cognitive, affective and attitude enhancement levels (Zenodo,2020). According to NCERT (2009) art integrated learning (AIL) is an innovative teaching learning process . It is a way to learn through the arts and with the arts . It allows learners to explore creatively . Considering the art as the base of medium learner explores the different topics joyfully and have art experience both in visual and performing arts . some of the visual art through which learner explores is drawing, painting, clay modeling, pottery , craft , mask, heritage crafts and puppet making , where as some of the performing arts such as music , dance , theater and puppetry. Hence, in the present paper the researcher is tried to explain the concept of art integration and why we need art integrated pedagogy for mathematics subjects and what are the literature reflect about the art integrated pedagogy in mathematics ,what are the possibilities and challenges of art integrated pedagogy and on the bases of literature some suggestions are given.

**Keyword:-Art integrated pedagogy, mathematics teaching learning, and art integrated pedagogy in mathematics.**

### **Introduction**

**“If a child can’t learn the way we teach, maybe we should teach the way they learn”**

**-Ignacio Estrada**

There are more than one ways to find the solution and develop own understanding . Mathematics allows the learner to explore the solutions in many ways to reach to the result . It is the universal language in which the universe communicates . Mathematics is dynamic subject and learning mathematics through art allows learner to explore, discover ,imaginative , problem solver and creative . Students will be able to visualise what they learn (BVS,2021). Students' enhanced desire and interest in studying are key outcomes of art integration into math instruction (Brezovnik,2015). Math lessons that incorporate art foster more curiosity and help students comprehend math ideas on a deeper level.It develops the children mathematics skill such as problem solving skills , creativity , critical thinking . While learning through arts the child undergoes different stages of learning . The child is involved in observing, thinking, imagining , exploring , experimenting , reinventing and expressing. And while going through these process the child 3 H’s that is head (cognitive), heart (affective ) and hand( psycho-motor ) is developed . It is experiential in nature and leads to holistic development of every student(BVS,2015).

### **Aim and Objective**

The aim of this paper is to discuss the need and outcomes of art integrated pedagogy of mathematics subjects trough literature review and suggestion and recommendation are given.

### **Mathematics and Art**

Mathematics can be understood as both a discipline and a means for communicating and expressing relationships in the surrounding world and within other disciplines, concerning relationships in space and time as well as between quantities(Asia Society, 2022). Art is understood in broad terms in this study, implying the visual art such as painting, drawing, sculpture, and design, architecture, music, crafts and poetry (Björklund,2017)

### **Meaning and importance of Art Integrated learning**

Art integrated learning is a process where art become the medium of teaching learning process in all subjects . The integration of arts with various subjects involves various forms of art such as

visual, performing and fine arts . It is teaching learning through the art and with the art. As a result of integrating the art in various subject it allow learner to be creative and it provides holistic learning experience as well as experiential learning.

A deeper comprehension and construction of knowledge about various topics are brought about through exploring through arts.

Vikaspedia domain (2021) argues that learning through art provide opportunity according to age appropriateness . This resonates with the experiential learning approach (NCERT , 2019)

According to Guidelines published by NCERT Art Integrated Learning (AIL) is a framework for experiential learning environment . AIL provides an equitable learning environment for all learners through their own access points. Students engage in art activities and construct personal meaning through their learning in an art integrated environment. (AIL, 2019 p.1). The pedagogy of AIL has been made part of National Initiative for School Heads and Teachers' Holistic Advancement (NISHTHA), an initiative of Department of school Education & Literacy,MHRD, to prepare teachers of elementary classes for holistic development(MHRD, 2019).

At all stages and to all learners of different disciplines require skills such as creative thinking, critical thinking and problem solving abilities as also mentioned in NEP( 2020). So , when Art is integrated to different subjects it helps child to explore , investigate , enquire , critical think and creative think for the in-depth understanding of the concepts. Art integrated learning supports or we can say is resemblance of experiential learning. As it enables learners to experience the situation , derive meaning and develop the understanding accordingly by having various learning experience . Learning through art allows learner a holistic experience to nurture their talents and have joyful classroom , certain life skills , communication skills , reflective nature , enquiry skills ,high confidence level, self esteem , aesthetics and creativity( CBSE, 2019).

It is important to realise that while art education and art integrated education may be mutually exclusive, they complement and strengthen one another. Students need art education to develop their creativity and appreciation of art, but it's also important to teach them how to conduct art-based research.

Art Education is a necessary precursor for the adoption of Art Integrated learning (CBSE Circular,2019).

On the basis of the circular by NCERT(2019) it has been decided that art education as a co-scholastic area will be integral part of secondary level curriculum . According to the principle of "connecting knowledge to life outside the school, ensuring that learning shifts away from rote methods and for enriching the curriculum, so that it goes beyond textbooks" says NCF(2005). Art shall be integrated with the T-L process of all academic subjects from class I to XII. The schools may also promote and offer visual and performing arts-based subjects at the secondary and senior secondary levels(NCERT , 2019). According to Wikipedia (2019) the discourse on arts advocacy in education is complex and multifaceted , with different view and perspective on the role and importance of arts in education . currently , there are two main aim opposing views in support of arts in education, which can be broadly categorized as economical and philosophical perspective . The economic perspective emphasizes the practical belief of the arts education , such as teaching the 21<sup>st</sup> century skills like collaboration, creativity and innovation. According to this perspective the art education can lead to higher academic achievement and better career opportunities for students. In this view, the arts are valued primarily for their instrumental value in contributing to the growth of the economy.

Whereas philosophical perspective emphasizes the intrinsic value of the art in education, focusing on the unique and irreplaceable role that the art play in promoting creative inquiry , critical thinking and personal growth. It provides opportunity to explore and express their own ideas and perspectives , to develop their own voice and identity and to gain a deeper understanding of themselves and the world around them . In this view , the art are valued for their intrinsic worth as a mean of enriching and enhancing the human experience.

Tension between the utilitarian, workplace-focused view and the educational, growth-centered framework on advocacy continues to shape and reshape the arts education universe as revisions to the National Core Arts Standards reflect fluctuations in advocacy rhetoric.( Logsdon ,2013)

### **Why art integration in school curriculum**

Position paper on national focus group on arts, music, dance and theater (2006) says that it's a high time that if we want to retain our pure unique cultural identity . our diversity and the richness of our country we need to integrate art education in our curriculum. But whenever it comes to integration we face problem of awareness and understanding the role of integration in

our multidisciplinary educational context . Theories of curriculum integration are rooted in principles of progressivism and constructivism. Education focuses on holistic development through the integration of academic disciplines and learning is an active construction of meaning(Horin.et.al,2022).Art Integration in curriculum connects the children’s experiences and the artist-educators’ experiences of how learning became possible in different ways, it is argued that enriched conditions for learning can be fostered through integrating art forms (here dance and visual arts) and by tools that constitute an embodied and culturally sensitive pedagogy(Neilsen,2020).

### **Steps taken towards Art integration in India in the mainstream curriculum**

In our Indian culture , art education has its place in our school curriculum. Unfortunately, as the focus on academic achievement — where the arts began to count as extracurricular — began to take centre stage, art instruction took a back seat ( Mishra , 2019).

History of Art Integration in curriculum.

<b>Year</b>	<b>Steps towards Art integration</b>
1952-53	Education commission emphasized the release of creative cultural awareness among students.
1956	National Bal Bhavan (NBB) created under MHRD to look after art education.
1964-66	Kothari Commission emphasized the significance of education for creative expression.
1986	Cultural exposure and community involvement to keep Indian art culture alive was recommended by the National Policy of Education (NPE).
1992	Program of Action (POA) encouraged the young generation to participate in cultural

	activities
1993	Government has set up a statutory organization NCTE (National Council for Teacher education) which focus on teacher education programs for art and craft
2005	<p>National Curriculum Framework (NCF) “<i>Art as a subject at all stages covering all four major spheres, i.e. music, dance, visual arts and theatre....We must bring the arts squarely into the domain of the curricular, infusing them in all areas of learning while giving them an identity of their own at relevant stages</i>”.</p> <p>Every school must start teaching arts education as a topic that is required (up to Class X), and every school must have the resources to do so. Music, dance, visual arts, and theatre are the four main areas that the word "arts education" refers to Indian traditional arts said by NFG (2006).</p>
2009	The Right of Children to free and compulsory Education Act also made provisions for making Art education compulsory in schools DSEL(2009).
2010	Country report , NCERT , DAEE (2021) said that Art education encourages cultural awareness and practices . It also develops creativity , individuality and expression through art activities.
2020	According to NEP(2020) “ <i>art-integration is a cross-curricular pedagogical approach that utilizes various aspects and forms of art and</i>

	<i>culture as the basis for learning of concepts across subjects.”</i>
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### **Art Integrated pedagogy in mathematics Teaching**

The main purpose of Art Education is to develop creativity, individuality and expression through art activities (Prince ,2020). Our findings are in line with prior research and studies, which have shown and validated that sustained engagement in fine art activities benefits mathematical thinking in ways like intrinsic motivation, visual creativity, and contemplation on how to come up with original ideas (Brezovnik, 2015). The arts- integrated curricula is means of learning and used as both a teaching strategy .When students participate in the creative process to investigate links between an art form and another topic area to develop deeper understanding in both, they fulfil dual learning objectives. (Prince, 2020). Analysis of students’ visual-spatial thinking processes indicated that students made use of four major visual-spatial thinking processes in Studio Thinking Based-MathArt Studio Environment, which were recognizing geometric shapes, decomposing and composing shapes, patterning, and transforming geometric shapes (Mehtap, 2019).

Looking at the importance of art integrated teaching learning in school curriculum, many studies around the world were conducted to identify the pros and cons of art integrated pedagogy in education and some of studies specially conducted for mathematics subjects (Aghasafari, Bivins & Nordgren (2021), and Pant, Luitel & Shrestha (2020). The previous studies shows that art integration in mathematics subjects is an important context for developing students' spatial understanding and proportional thinking abilities associated with artistic as well as mathematical ability (Edens and potter, 2008), arts integration have the potential to benefit learning and emerge as a pedagogy (Pant, Luitel & Shrestha, 2020) ,Paradis & Scrip 2014, Brandon and Lawton (2007), Beerman 2012, Lisa (2013). Further, students enjoyed mathematics on a high level throughout the intervention period (Beerman 2012). Knowledge gained through the arts to deepen their understanding in other courses. Finally, allowing students to be creative increases their

motivation and interest, leading to better test scores, problem solving skills (Aghasafari&Bivins&Nordgren, 2021;Goodson, 2022; Nuvton , 2021).

### **Art Integration Pedagogy: Possibility and Challenges**

Bjorklund (2017) says that when mathematics is integrated with arts and other creative activities it gives children and teacher a common be creative and build their reasoning. This builds on the provision of awareness, meaning that mathematics is made an object of inquiry(Bjorklund &Bjorkman,2017). When art isintegrated at elementary level the students achive the deeper level of understanding. Both professional standards and curriculum standards are calling for teachers to be better prepared in terms of their knowledge, skills, and dispositions related to the arts( Lisa, 20130). While teachers' beliefs in the importance of arts integration are critical, they also need support from the administration in the form of resources and professional development in order to effectively practice arts integration(Williams,2013). The fine art activities offers advantages related to mathematical reasoning , intrinsic motivation and reflection on how to generate creative ideas (Brezovnik,2015).

### **Conclusion**

Art Integrated Learning is a process and not a product or outcome. It is a method of making education process interesting and effective. Its practical implications are based on cognitive, affective and attitudinal changes in the students and consequent proactive transformation of the student towards learning (Prince,2020) .We can confirm that our method of teaching mathematics with fine art integration enabled greater academic achievements(Brezovnik,2015). The aim of connecting two subject is to make education absorbing and effective. The aim of basic education is to give them fundamental knowledge that a children uses daily throughout his/her life (Brezovnik,2015).Teaching through art makes classrooms active , joyful and vibrant. This makes teaching more participatory and makes student procative . Homework become joyful and experiential. Pedagogy became student friendly and student oriented(Prince,2020).The study result shows that art education develop creativity, individuality, expression, mathematical reasoning, intrinsic motivation, visual imagination, visual spatial thinking and spatial understanding.

### **Educational Implication and suggestion for the study**



- It was found that teachers are not well trained and aware about art integrated teaching learning pedagogy, hence, Regional and state level trainings should be organised.
- Teaching makes joyful and meaningful hence learning activity should be designed carefully.
- For providing experiential learning experiences, more hands-on activity should be organised.
- Learning environment should be carefully designed so that maximum learning outcome will achieve.

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