

ROLE OF COMPUTER-AIDED TOOLS AND TECHNIQUES IN THE DELIVERY OF FINE ARTS EDUCATION

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Abstract: *The conjunctive use of technology and art has been shown recently to produce synergistic output. With the cutting-edge development taking place in science and technology, art design teaching has got an impetus. In fabric painting, tile painting, glass painting, clothing and textiles printing, photography and other form of fine arts the use of computers in designing has become common. With renewed potential to have endless expansion in the technical content, aroused students' thinking, need-based creative motivation, teaching of basic and applied theories, and demonstration of success stories as examples for the art design educators, the goals are being achieved remarkably well. The contemporary times calls for full use of computer technology, application of computer-assisted design technology, application of methods of sound, electronic picture and animation to display teaching content, use of multimedia, model and simulation based approaches to art design teaching, can greatly improve quality and efficacy of teaching. This technology has played a significant role in the promotion of art education. It has made the customary drawing method progressively being replaced by systems like Auto CAD which are getting popular in areas such as the interior design, product design and other drawing versions. Computers are making certain kinds of fine arts more handy and productive. The age-specific drawing apps need to be made available for children to suit their creative and technical skills so that it could nurture creativity in the art classroom. The desirable shift in the creative focus of knowledge leads to the creation of innovative thinking. This is also desirable as per the new education policy implemented by the Government of India.*

Keywords: Art design, Art education, Computer-assisted design, Creative teaching, Digital teaching, Policy, Strategy

Introduction

History is replete with examples of how novel technologies and scientific marvels have eased new forms of creativity. Computers are relatively newer examples (Ornes, 2019). Presently, with fast development, computer technology has been used in diverse fields and also in art design (Cui and Ren, 2016). Computer-aided design are being followed in educational institutions in many countries. This technology has played a significant role in the promotion of art education. Nevertheless, a wide gap exists between countries as some have progressed greatly and the others are still in the beginning.

Efforts are being made for improvising and updating the existing versions of softwares, making their functions greatly useful. It is generally easy to master the use of

flatgraphicdesignsoftware, such as engineeringdrawingdesignsoftware(AutoCAD,Photoshop, etc.). Withthe availability of other professional software, the professional courses for design havegone throughremarkableimprovements owing to the adoption of state of the art computer-aided system (Fu, 2010). It has made thecustomarydrawingmethodprogressively being replaced by systems like Auto CAD which are getting popular in areas such as the interior design, product design and other drawing versions(Fu, 2010).The traditional hand-painting techniques have been substituted with new graphic designs, computer-aided designs, etc. involving the general use of software.

Right from the age of two children begin drawing and in due course they get to absorb how to draw or paint on paper with crayons and water colour. Today, children have also started trying their hands on smartphones as some are using drawing apps as well. According to Yadav *et al* (2022) children of 2-12 years scribble using more than one media. Those of 2-3 years are keen to have apps with meeker interface. They find it stimulating to scribble with radiant colours and listening to background music while movingtheir fingersin harmony. The 4-6 year old children drew modest shapes using multi colours. They have learnt to use the *eraser* feature of the apps. The 7-8 years old children successfully draw natural sceneries with the touch of brushes. While colouring they use the art of *flood fill* and *undo* commands. They are able to open and save their art work as well. The 9-10 year old kids were able to use the *redo* and *zoom* buttons. They, however, didn't relish the small canvas. The 11-12 year old children use *erasers* of varied sizes. Yadav *et al* (2022) suggested designing age-specific drawing apps for children to suit their creative and technical skills so that it could nurture creativity in the art classroom.

The present time witnesses graphic designs to be the soul of publicityefforts with the involvement of fine arts. Computers are making certain kinds of fine arts more handy and productive.

Features of Computer-assistedDesigns

The discipline of computer-aided designs has progressed tremendously in recent times leading to the expansion of computer-aided design in professional design classes. The old-fashioned designing techniques in drawing, which were not able to copiouslynurture therequired imagination are getting substituted with the computer-aided designing in the class. It gives the advantage of doing away with the constraints of material based technology in the art creation process. This shift in the creative focus of knowledgeleads to the creation of innovative thinking. This is also desirable as per the new education policy (NEP, 2020) implemented by the Government of India.

Students imbibethoughtfulnessanddevelop an acumen of designcreationthat enhance their creativity. When the curriculum delivery is computer-aided it is amenable to distance education as well (Chen, 2009). The computer technology has a potential to simulate reality, organically integrate instruction content, and ischoolforstudentstoacceptandcomprehend.Nevertheless, consideringtheenhancementofstudents'excellence,theuniqueness of conventionalhand-paintedcreationsforlearners'comprehensive performance, the hand-made and computer-aided designin conjunction has become favoured with art design institutions as popular teaching model for undertaking teaching of fine arts.Learning this technology is often useful and suitablefor the students. The students with relatively high proficiency in computer-aideddesigningtechnology often hasexceptionally better painting skills (Chen, 2009).

Several designers have excelled from theory to practice. In fact, the bearing of traditional craftsmanship in conjunction with up-to-date high-tech processes has caused enhanced output.

Advantages of Computer –assisted Fine Arts Education

The concepts and techniques of computer-aided art designing have given an impetus to the teaching of art design in colleges and universities. Some of the benefits are discussed here.

In fabric painting, tile painting, glass painting, clothing and textiles printing, photography and other form of fine arts the use of computers in designing has become common. It has made the field of design art and its presentation greatly diversified. The advancement and innovation of this technology has opened up broad areas for the development of art designing education in colleges and universities. It is producing its effect in classroom teaching or hands-on training in the workshops and art galleries for teaching and training.

The art education using computer aided concepts and approaches are generally attractive to the learners (Zhou, 2014). It has led to a significant improvement in the student interest in learning the subject and enhanced their efficiency. Students who are being imparted education in computer-aided mode do not require learning the code as they are able to design videos or pictures using the computer-aided software itself.

Any modification in shape, colour, and texture or in any other features without loss of canvas, media and other art inputs is possible with this technology. Further, it being highly skillful and quick the output is attained with precision and accuracy as compared to traditional methods.

It is plausible that the additional design images created using computer software greatly motivate the user toward nurturing imagination of achieving the desired creative effect (Chen, 2009). The application of computer, multimedia and network skills in specialized teaching can diminish the inadequacies such as meager self-control, work lethargy, etc., which the learners are facing while working using traditional methods. The computer aided education in fine arts often has led to enriched creative forms and visual images.

It has the potential of social development as the art forms contribute to society a great deal. The computer-aided design technology is applied to the creation of design based art, design concepts and expressions, while influencing the aesthetic standards and visual appreciation by audience and learners. According to Tyler and Likova (2012) inspiration is an important aspect of the artistic experience, both for the one who created the art and the one who enjoys the artwork. As a fusion response, motivation involves the parts of brain which intercede the experience of emotions, inspirational rewards, and the gratitude of the aesthetic values of the impacting stimuli. Thus, inspiration can turn nearly any work in life into an avocation, a source of gratification in attaining objectives in life. Contrariwise, when motivation is missing, the learning, adaptation, and prosperity are hindered. Thus, motivation may be viewed as a strong feature of humanoid familiarity in connecting art and science.

The Computer-aided designs greatly help to update the education system and the relevant concepts. The use of computer-aided concepts gradually has become a thoughtful concept and digital art form that promotes the kindling of art design education system and design concept (Zhou, 2014).

Technology Fusion for Specialized Fine Arts

Science and arts seem to be two diverse disciplines mutually exclusively as they work on distinct creative thinking and logic. Science helps to understand physical world while art explores the cognitive boundaries, however they both share the same path in the purpose of cognition and can influence and fuse with each other (Liu *et al.*, 2022). These days, the use of computers has become widespread as an aid to art designing. Digital art such as web design, multimedia art design, CD-ROM disc design, video art design, and animation art design are developing at an amazing speed (Kang and Wang, 2016).

For strengthening the art design education in colleges and universities, and the integration of computer-aided design and art designing syllabi and practical exercises for different courses is the important. The situation arising out of COVID-19 pandemics has led to a new normal of virtual or online teaching almost in all domains. Art education is not aloof from this. The zoom technology and the like have shown their potential for enabling creativity (Irugalbandara, 2021). The virtual, technology empowered systems such as Zoom in transformed teaching and learning circumstances, and mark likely future research directions in terms of integrating technology and online delivery for Drama and Theatre teacher education as are also other art forms.

Started from the eighties, the computer-assisted designing is being widely used in the fields of graphic art, decoration, environmental art, industrial designing and in other areas. This frees the designer from arduous, sluggish and tedious work and motivates the imaginative creativity thereby elevating the ultimate visual art effect. The Human Resource Sections of the recruiters are now on the look for those candidates who are well versed with computer-aided designing. These are the new needs for design education in the prevailing and emerging times.

The Relevant Techniques of Inter-disciplinary Integration and Fusion

The computer-aided designing has emerged as an accepted new discipline of fine arts. It merits to be considered on a par with customary art designing such as decorative designing, eco-friendly designing, fashion designing, industrial designing, etc. For the study of art designing it is the elementary skill in which the concerned learner must attain proficiency (Kang and Wang, 2016).

In painting, the multicolored pictures are made with a brush. However, the use of computerized brush requires specific skills in the user. The computer technology can result into diversity of art effects, *vis a vis* saving time and energy.

The course syllabus for computer-aided design needs to be developed in integration mode with the widely used graphics techniques such as Photoshop, CorelDRAW, AutoCAD, 3D MAX, and office software such as Microsoft Word, Excel, and PowerPoint. A diversity of software such as Rhino, Maya, 3-D MAX, etc. are finding use in imparting art education. It has shown its impressive worth in the academic and industrial sectors.

In the new world of virtual reality a diverse variety of technologies such as computer graphics, computer simulation, artificial intelligence, multimedia, network, etc., skill are involved in various fields ranging from education to oceanography (Liu *et al.*, 2022; Shi and Niu, 2020). The blend of traditional design art education and cutting-edge computer-aided design has been felt as the imminent need of art design teaching activity.

The man-computer interface of traditional art based creative skills and computer based technologies has produced synergistic results taking the art forms to new level. Therefore, for proficiency in educational or commercial sectors the instructors for computer design, imparting training should possess sound knowledge and practical experience (Guo, 2010). The 3-D interface techniques such as 3-D MAX, VRP, etc., are proving their worth in virtual technology mode (Lin *et al.*, 2015).

Versatility of Computer-assisted Art Designing

The state of CAD has become increasingly important in the field of art designing with diverse intent (Cui and Ren, 2016). Such technologies provide liberty for designers to combine pictures as per need and to attempt different configurations to create special effects. It is a great creative and intellectual stimulation for the artists. CAD has a potential to improve designing with a level of precision and speed, reduce drudgery of designers, and minimize tedious process of intricate design works. Now, with the convenient accessibility of computer 3-D software, designers normally can perform their creativity using in a user-friendly way. A designer can use a simple cancel command to facilitate change of mistaken steps and have hassle free adjustment. Further, laser art technology is also in vogue in artistic circles. Now, it is possible to engrave a diamond crystal using 3-D software design and laser machine to produce complicated, miraculous and distinctive 3-D graphic effects.

Adoption of this skill-based approach has indeed revolutionized art designing. This has indeed led to a new concept of blending of technology and art. Art design now relies greatly on technology and users too accept the production. Thus the relationship between computer technology and art design is not at all conflicting but of interdependence and indivisibility. Technology and art synergistically produce innovation.

Designers are design subjects but computers are technology based tools. The CAD has immense application in the revamping art and animation based designing. With the rapid progress in economic wellbeing of people and progress in technology, creative designing of buildings are now involving ample use of CAD techniques that significantly enhances artistic appeal of buildings. Computer technology has really provided boost to animation designs that has now showcased 3-D effects. This has great played role in the films and documentaries as well. Recent examples are the feature films Jurassic Park, Star Wars, Bahubali and Char Sahibjades which had special animation effects. Now 3-D representation of animals, trees, buildings, sea, sand dunes, blue sky, clouds, etc are generated through animation art for the entertainment of viewers.

Multi-disciplinarity using Art Designs

Involvement of multi disciplines has been appreciated in arts. To enable artists and designers to admit the CAD tools and techniques design softwares are also becoming more intelligent. Painter softwares stimulates features of several traditional tools and it prolongs the conventional painting experience. In this painting software diversity of tools of mimicking traditional brush strokes and various painting material can stimulate oil painting, water colour, etc., easily.

Multi-disciplinarity of Art Designing

Different related disciplines have greatly contributed to the promotion of arts. The

computer-assisted techniques and tools have also been improved by getting in new need based advancements over a period of time. Painter softwares stimulate features of several tools and it has usefully extrapolated the conventional painting experience. For example, the diversity of software tools of mimicking the traditional brush strokes and various kinds of painting materials and other inputs can simulate various painting forms such as water colour, oil painting, spatula painting, tile painting, glass painting, fabric painting and canvas painting. The batik and new design patterns for textiles and clothes are generated through computer assisted technologies (Dekker *et al.*, 2020).

Computer-aided Teaching of Art Designing Classes

Like in other teaching programmes, thoroughly prepared course content in courses of computer designing is vital. The development of newer facilities of computer aided education such as graphics, in art design teaching has got increased importance (Yu, 2015). The practical skills and theoretical knowledge of teachers ought to be up to date. Teachers should keep abreast with the new developments in this specialized field and nurture their artistic acumen for better curricular delivery to students (Guo, 2010).

In the classroom of computer-aided designing the instructor conducts demonstration to students in front of the computer monitor. The students work step by step by watching the monitor. The accomplishment of students greatly depends upon the professional knowledge of teacher. While teaching computer aided design the instructor illustrates the procedure and responds to the queries of students and learners through an organic amalgamation of courses (Wen, 2001).

One of the attractions of computer-assisted art activities is that more and more people are able to involve themselves in creating artwork that otherwise was somewhat impossible previously (Ornes, 2019). Computer programmes finally empower man and in return it is the man who pulls it all together. When an artist makes use of a conceptual form of art, he or she makes entire planning and decisions prior to execution in a rather perfunctory manner. The idea develops the human machine that creates the art (LeWitt, 1967). The novel computer-assisted tools may not only produce art but also enhance his creative skills innovatively. When it comes to 3D-MAX material production there is often an organic blend of decorative materials and creative courses (Wen, 2001).

The integration of software and know-how can be gainfully used for delivering art design related information efficiently. With this approach, students can discuss, research, and explore new innovations in creativity. With this experience, they can have profound retention of the software based and subject based acquaintance. This teaching method is vivid, allowing students to instinctively recognize the space and structure of the object. The planning of the lights and shades in designing is rather important. The mixture of their source are important to sense the pattern and design of the light and shade. The exposure to this approach motivates students to make better use of the software to fashion executions, laying a sound basis for the artistic future.

Provision of instruction plan is important for students to acquire proficiency in computer-aided design techniques (Li, 2015). A number of colleges and universities teach using a software. To elucidate the rendering process and strengthen the complimentary use of the 3D-MAX software and the VRAY renderer (Li, 2015), machine learning enhances our learning and creative ability (Ornes, 2019).

Designing of Computer Visualization

The prevailing time is of interdisciplinarity. No discipline play its role in isolation. There must be perforation of walls across disciplines. In the world of art education, encompassing visual culture, artists and scientists to create work that the general public understands from interdisciplinary visual designing perspective is a new normal. Science and arts had been separately dealt since ancient period. Before the development of computers, drawings made manually was the general technique for scientific visualization. Famous astronomist and philosopher Galileo drew the visualization of moon cycle through manually drew lines. Although with the astonishing developments that happened in the information technology (IT), the computer aided drawings are in vogue but still there are artists who prefer to draw manually. In the nineties, a novel field referred to as 'virtual technology' emerged that blended multiple technologies of artificial intelligence, computer networking, data processing, computational graphics, mechanical designing , etc., that also reflected in fields of artwork as 'virtual arts'. When an artist hits the technology and digital media, he or she doesn't perform the main work of art. He rather turns to be a more network player in digital media as digital artist. Digital education has greatly impacted art education in the universities in terms of autonomy, independence and self-critical capability among students and learners (González-Zamar and Abad-Segura, 2021). Presently, art teachers of different classes are shifting in the use of instructional technology in the art classroom for exploring art, discussing art, and creating art (Geiger, 2009). Socially engaged art has been reported as creative pedagogy to fill the educational spaces in the classroom teaching (Flemington, 2022). According to Jin and Yang (2021) computer-aided design software has extended to diverse fields. It plays a useful role in teaching environmental art design to students.

The new digital arttype has begun to designateseveralart works that have co-travelled with the advance of digital technologies (Ozdemir, 2022). Generally, digital art comprisesall from high-end machine learning use to the application of communicating elements in customary media. There is also an increase in the interaction between IT and art. Scientists, artists and researchershave been collaborating and using electronic strategies to generate art and creativity. With the growth of digital art, there is aamazingupsurge in the improvising of art.

Computer imaging can stimulate objective production in 2-D or 3-D mode. The artificial intelligence visualizes computer to think intelligently. This leads to unique kind of creativity in the form of images, graphics, animation, etc. There is a new concept called computer simulation that implies use of computer software to mimic abstract data and models of a specific system. The disciplines of arts and science have blended so well that scientific art exhibitions are being held (e.g., the Chinese exposition on 'The Evolution of Things: Scientific and Artistic Views' that combined life sciences, material science).

Maximizing Scientific Know-how

Interdisciplinary fusion is generally known as an important part of art world encompassing wide ranging fields and per se with the holistic educational philosophy of Steam (a video game digital distribution service).The new-fangled model is predicted to bring in the benefits of computer technology for the education of art classes, which promotes the systematic development of art education and improves the professional education of art teachers and learners as expected (Li, 2021).

Technology has a great contribution in taking the education and training of art and designing from the practitioner point of view (Wu and Yu, 2019). Those who practice designing can

create interdisciplinary artistic production based on science, engineering, technology, art, mathematics and other fields. New ideas are given vent, breaking the barriers between domains. This proves immensely innovative and creative when viewed from the perspectives of science, collaboration, art and experimentation. The development of digital technology in relation to educating art and designing has established its credentials in the contemporary society (Baran, 2020; Xu and Gu, 2019),

Diversified Art Designs

In the aforesaid description it has been made clear that when art and science work in synergy wonders are created as far as creativity and innovations are concerned. This has great potential in the delivery of curriculum and training to learners of fine arts. Artists can be special science educators and *vice versa*. The artist's science emanates motivation to learners for art creation and the invaluable creativity of art provides vibrancy to science. On the other hand scientific principles govern the artistic marvel of drawing and designing. The virtual reality interaction art has developed rather swiftly with the information communication of the internet. The artist's creation in virtual space not only augments the aesthetic value of the artists themselves but viewers' cultivation as well. In France, there is a well-known museum called 'theLouvre deParis'. It uses virtual reality technology to set up a virtual museum where the art work has diverse modeling techniques to build and add interactive trait for the benefit of visitors. The *Virast-e-Khalsa* at Sri Anandpur Sahib (Punjab, India) and different planatoria also uses light and sound effects artistically. These are great places for art education of the visitors.

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