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ARTech Review: E-Learning of Visual Arts Education

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ABSTRACT

The development of modern technologies, applying pedagogical principles, has enabled a new educational paradigm of teaching and learning in visual art. The basic task is to cultivate creative ability, human aesthetics, and appreciation. Using e-learning can encourage students to become more aware of themselves. Communicating and feeling connected to others are critical for students in online settings. The purpose of this article is to provide an overview literature in e-learning, art education, educational technology, and other education-related fields, to articulate: 1) what is currently known about online teaching and learning, (2) how the field has been conceptualized in the various research in education, and (3) what might be useful areas for future research. The database from Scopus, Mendeley and ERIC from the year 2020 – 2022 were used. This study employed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach to recognized standard for executing advanced systematic literature review to select articles and undertook thematic analysis to analyse the data. The review indicates that, the e-learning strategy depending on the teacher's credibility and level of learner's technology literacy. While the online learning experience in art education represent utilization of IT and multimedia in generating creative thinking skills and product innovation.

1. Introduction

Art education known as an important part of aesthetic education. It is regarded as a crucial component of aesthetic education. For a person to develop comprehensively and in a healthy way, art education is essential. The primary goal is to develop human aesthetics, appreciation as well as creative ability. The development of young students' humanistic cultivation, spiritual development, and creative abilities can all be improved by art education [1–3]. It is of inestimable value to society, culture, and anthropology in fostering the healthy and comprehensive development of individuals. The advancement of multimedia information technology offers a fresh approach to art education and teaching in the modern classroom [4–6]. This type of teaching may help students improve the concepts and methods used for traditional art education and to judge their aesthetic value [7, 8].

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Nevertheless, due to the constrained teaching conditions, traditional art education multimedia technology possesses low teaching impacts. This necessitates the employment of interactive fusion technology as well as multimedia technology [4]. The students and teachers were compelled to alter their common methods of instruction, learning, and interaction in order to cope with the new circumstance. The old face-to-face or physical education system will need to be replaced with an entirely new educational framework [9,10]. To make traditional art education possess new professional teaching abilities, it is critical to have a fresh grasp of the evolution of visual sensing technology in digital image art at this juncture [11,12]. The use of digital design processes in artistic education facilitates students to improve their establishment with regard to autonomy and self-criticism. Apart from that, digital technology has changed how universities teach their students and how they build cross-disciplinary abilities. Since the multilateral potential of this field greatly influences those personal and substantial achievements on which the personality of the current teacher is directed, it was highlighted that the primary focus in pedagogical practice must be positioned on the establishment of the creative abilities of students of pedagogical specialties [13]. It is a multi-structured teaching mode that combines art teaching theory with computer digital multimedia technology to create a new approach predicated on computer-aided art teaching [14, 15].

Information and Communication Technology (ICT) has provided a great opportunity to promote a student-centered learning approach in visual arts education by enriching and transforming the area of the subject to allow students to construct their own knowledge, meaning as well as solutions [16]. Furthermore, ICT provides a platform to the students a real-world experience through simulation, manipulation, and creative expression to solve the collaborative problem approach [17,18]. There is indeed a close connection between arts and creativity. Therefore, some reflective analysis of how the arts curriculum is enacted and its role in fostering learners' creativity in schools must be adapted and adopted in a new understanding of cognition, learning and creativity [19]. Malaysia Education Blueprint (2013-2025), published by the Ministry of Education Malaysia, reveals Malaysian education system reinforces certain academic domains, which include science, technology, engineering, and mathematics (STEM) education, in order to bear the capacity to boost the country's economy [20]. As aforementioned, visual arts is a subject that focuses on the establishment of critical thinking skills, innovation, as well as creativity. However, due to conventional classroom teaching, students' artistic potential and knowledge of art are limited [21]. The review indicates that, although there has been extensive work to conceptualize and understand the implementation and effectiveness entailed by e-learning in education, there were lack of studies that connects these concepts to subject-specific strategy and experiences of e-learning in the field of visual art. That is, the literature provides insights into e-learning strategy and student's experiences among visual art teachers and students.

2. Material and Methods

2.1 Identification

In choosing several appropriate papers for this report, the systematic review process consists of three main phases. The first step is keyword recognition and the quest for linked, similar terms based on the thesaurus, dictionaries, encyclopaedia, and previous studies. Accordingly, after all the relevant keywords were decided, search strings on Scopus, Mendeley and ERIC database have been created. In the first step of the systematic review process, the present research work successfully retrieved 1868 papers from the databases.

2.2 Screening

The first stage of the study rejected 1713 papers. Research papers were ruled out due to the publication year less than 2021, systematic reviews papers, no empirical evidence, books, book series, chapters, and conference proceedings. The second stage screened 155 papers based on the scholars' various exclusion and inclusion criteria. As literature (research articles) is the major source of practical advice, it was the first criterion used. Furthermore, the review was limited to English-language publications. It is important to remember that the plan was established for the past two years (2021- 2022). In order to meet the analysis objective, only research executed within the visual art field was chosen. In all, 16 publications in the qualitative and quantitative analysis were chosen.

2.3 Eligibility

A number of 16 articles were included in this third level, called eligibility. These articles were chosen based on study's objective and the field of art education, e-learning, technology in art education from the perspective of educators and students. At this stage, all article titles and important text were carefully scrutinized to confirm that the inclusion criteria were satisfied and the articles were appropriate for the current study's research objectives. As a result, 112 papers were removed since their title and abstract were not significantly relevant. Finally, 16 articles have been made accessible for review (refer to Table 1)

Table 1

The selection criterion is searching

Criterion	Inclusion	Exclusion
Language	English	Non-English
Time line	Between 2021 – 2022	< 2021
Literature type	Article	Review, Conference and Note
Subject Area	E-learning, technology, teaching and learning and visual art	Besides E-learning, technology, teaching and learning and visual art

2.4 Data Abstraction and Analysis

In this study, an integrative analysis was employed as one of the assessment strategies to examine and synthesize numerous research designs (qualitative, quantitative, as well as mixed methods). The goal of the expert study was to identify relevant topics and subtopics. The data-collecting stage was the initial step in the theme's development. As depicted in Figure 1, the authors meticulously analyzed 16 publications for assertions or material relevant to the present study's topics. Subsequently, the authors assess e-learning, technology, teaching and learning visual art throughout the identifying and establishing significant groupings in the second stage. From this point forward, the authors then continued each established subject, along with any themes, notions, or ideas. During the data analysis process, a log was kept to record any analyses, views, riddles, or other thoughts pertaining to the interpretation of the data. In order to spot any irregularities in the theme design process, the scholars finally compared the outcomes. It is worth mentioning that if there are any discrepancies among the concepts, the authors discuss them among themselves. By establishing domain validity, the expert review phase guarantees each sub-theme's importance, clarity, as well as suitability. Below is the flow diagram with respect to the proposed search study (Figure 1) and the list of research article findings based on the proposed searching criterion (refer Table 2).

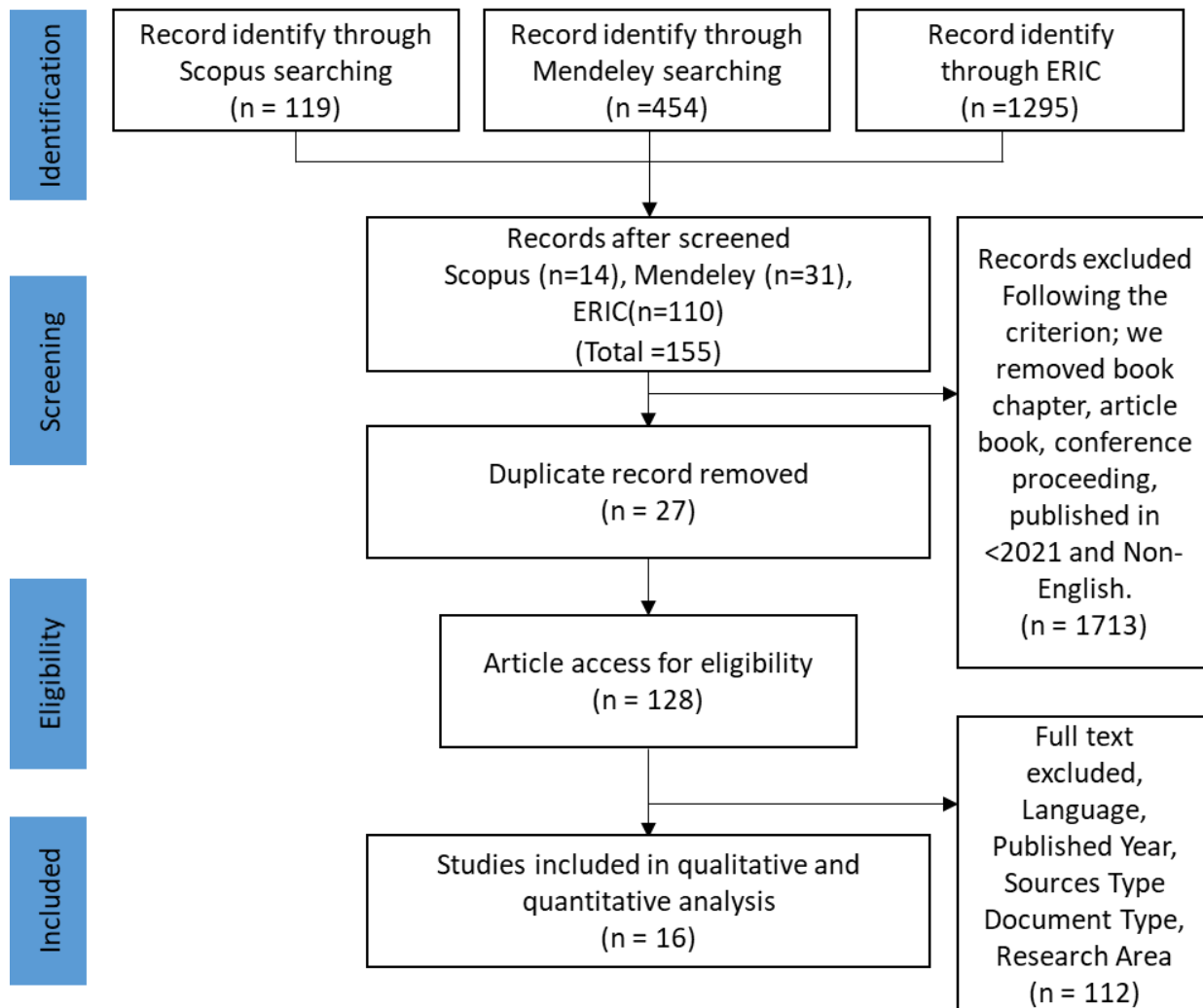


Fig. 1. Flow diagram of the proposed searching study

Table 2

The research article finding based on the proposed searching criterion

No	Author	Journal	Title	Scopus	Mendeley	ERIC
1	Feng, L., Zhang, W.	2022 Computer-Aided Design and Applications	Design and Implementation of Computer-Aided Art Teaching System based on Virtual Reality	/		
2	Cao, Q.	2022 Security and Communication Networks	Curriculum Design of Art Higher Vocational Education Based on Artificial Intelligence Assisted Virtual Reality Technology	/		
3	Pathania, M., Mantri, A., Kaur, D.P., Singh, C.P., Sharma, B.	2021 Technology, Knowledge and Learning	A Chronological Literature Review of Different Augmented Reality Approaches in Education	/		
4	Tomaš, S., Tomasović, J., Kuščević, D.	2021 Informatologia	Applying the moodle system in teaching contemporary art	/		
5	Leung, S.K.Y., Choi, K.W.Y., Yuen, M.	2020 British Journal of Educational Technology	Video art as digital play for young children	/		
6	Hautopp, H., Ejsing-Duun, S.	2020 Electronic Journal of e-Learning	Spaces of joint inquiry through visual facilitation and representations in higher education: An exploratory case study		/	
7	Ye, L., Su, H., Zhao, J., Hang, Y.	2021 International Journal of Art and Design Education	The Impact of Multimedia Effect on Art Learning: Eye Movement Evidence from Traditional Chinese Pattern Learning		/	
8	Sedon, M. F., Zulkifli, C. Z., Khairani, Z., Sabran, A. B., Zalay, A. A., & Khairani, M. Z.	2021 International Journal of Entrepreneurship and Business Development	Covid-19: Disadvantages Of Online Learning Towards Visual Arts Practiced-Based Nature		/	
9	Tomsic Amon	2022 Cogent Education	E-Studio: The use of information and communication technologies in the development of drawing competences in different educational environments		/	
10	Bi, H.	2021 Computer-Aided Design and Applications	Feasibility analysis of teaching reform of computer-aided for environmental art design course		/	
11	Ghai, A., & Tandon, U.	2022 Higher Learning Research Communications,	Analyzing the Impact of Aesthetic Visual Design on Usability of E-Learning: An Emerging Economy Perspective			/
12	Adeloya, AA	2021 Yildiz Journal of Art and Design	Attitude of students towards teaching art and design using ICT tools in secondary schools in Akure, Ondo State, Nigeria			/
13	Bogiannidis, N., Southcott, J., & Gindidis, M.	2022 Contemporary Educational Technology	An Exploration of the Lived Experiences of a Visual Art Teacher in a Smart Classroom			/

Table 2

The research article finding based on the proposed searching criterion (continued)

No	Author	Journal	Title	Scopus	Mendeley	ERIC
14	Yustina., Mahadi, I., Ariska, D., Arnentis., & Darmad	2022 International Journal of Instruction	The Effect of E-Learning Based on the Problem-Based Learning Model on Students' Creative Thinking Skills During the Covid-19 Pandemic			/
15	Mamur, N. & Özsoy, V., & Karagöz, İ.	2020 International Journal of Contemporary Educational Research	Digital Learning Experience in Museums: Cultural Readings in a Virtual Environment			/
16	Salehudin, M., Nasir M., Hamzah, S. H., Toba, R., Hayati, N., & Safiah, I.	2021 European Journal of Educational Research	The Users' Experiences in Processing Visual Media for Creative and Online Learning Using Instagram			/

3. Themes

The research findings of this study revealed two main themes, namely e-learning strategy in art education and student's experiences in e-learning.

3.1 E-Learning Strategy in Art Education

A new educational paradigm of e-learning has been made possible by the advancement of current technology and the application of pedagogical principles; this paradigm represents high-quality assistance for teachers in the dissemination of information. This study will systematically review articles that portray the teaching and learning strategy in art education. In an educational experiment involving 57 children from two primary schools in Split-Dalmatia County, research by [22] identified disparities in fourth graders' knowledge of and preferences for contemporary art in relation to teaching techniques. In a group utilizing the Moodle system and in a group of students producing artwork inspired by contemporary artworks, the outcomes revealed growing student preferences for contemporary art. A modular object-oriented dynamic learning environment is what the abbreviation Moodle stands for. Like any e-learning system, a modular system is made up of smaller modules or activities that, when combined, make up the whole.

When a system is created using objects, entities with clear roles, and stated data sets, it is said to be object-oriented. The learning process is actively engaged by the student in the dynamic Moodle learning environment. Moreover, students said they enjoyed using Moodle to learn about modern art. In the groups who received art lessons, the difference between the knowledge test scores at the beginning and end demonstrated statistical significance [22]. In teaching visual arts, specifically teaching contemporary art, this study explores the potential applications of e-learning systems. Different scenarios for learning, teaching, and testing the knowledge of contemporary art are made possible by well-designed and implemented teaching content in an e-learning system. Thus, contemporary art turns into a form of communication in which the audience assumes the role of interpreting the various layers of a work's meaning. The criteria of Moodle System showed in Figure 2.

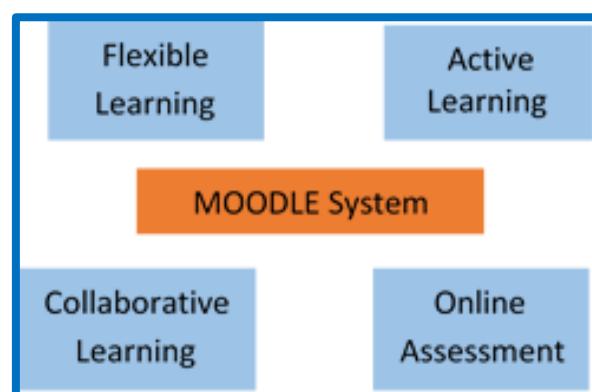


Fig. 2. Modular Object-Oriented Dynamic Learning Environment

The art education curriculum in secondary and primary schools is steadily adding cutting-edge science and technology as a result of the ongoing promotion of educational reform in recent years. It effectively avoids the drawbacks of traditional art teaching, such as mechanical replication and simple retelling, via the use of Virtual Reality (VR) technology in the classroom. It is a multi-structured

teaching mode that combines art teaching theory with computer digital multimedia technology to create a new approach predicated on computer-aided art teaching [14]. Meanwhile, by enabling dynamic interaction between the course and the teacher, Augmented Reality (AR) is an interactive technology that transforms learning environments. When AR is used in education, the learning process may be made more expressive, efficient, and effective. Due to AR's capacity to create an immersive and engaging environment, several research initiatives have recently been developed to integrate AR with teaching. This article compares the advantages of AR to customary technical platforms (including VR, MOOC courses, and e-learning) as well as traditional schooling approaches (old-style books and chalk and talk) [23]. Furthermore, this study includes a chronological overview of the various AR methodologies used in education and training, as well as research that has been conducted on the subject. The report also discusses the current state of the art in research, the evolution of technological trends through time, and the topics and related domains that have been investigated [24].

The benefit of e-learning can be seen in smart classrooms. In a study by [25], interpretive phenomenological analysis was employed to comprehend the lived experiences of an art teacher whose classroom was converted into a smart teaching and learning space utilizing a variety of technologies to improve the efficiency of curriculum delivery and cater to individual learning needs. The case study shows that converting traditional classrooms into smart learning spaces by utilizing learning technologies improves teaching and learning by blurring the lines between digital and physical spaces, increases mobility and flexibility as well as creates additional opportunities for learning, frees up teaching time to address learning needs, raises time on task, and utilizes time more efficiently [25]. This study involved the review of the e-learning strategy during the pandemic. A study by [26] aimed to assess the impact of e-learning depending on the Problem-Based Learning (PBL) model on the creative thinking skills of the students throughout the Covid-19 pandemic. At As-Shofa Islamic Senior High School, Pekanbaru, Indonesia, class XII Science, a quasi-experimental design and pretest post-test control group design were employed to perform the study.

This study used four variables to measure the ability to think creatively: originality, elaboration, fluency, and flexibility (Figure 3.). 20 multiple-choice items were included in a test of creative thinking that was used to collect the data. The N-gain index (g) was used to analyze the Min, Nmax, Nmin, Sd, and the efficacy of creative thinking data. Subsequently, the outcomes demonstrated that the experimental class employing the PBL model through e-learning had higher post-test average scores for students' creative thinking skills than the control class without the PBL model, and that the experimental class's N-gain was greater than that of the control class. In light of the findings of this research, it can be concluded that using a PBL learning model for e-learning during the Covid-19 pandemic has a positive impact on students' capacity for original and complex thought [26]. In higher education, a study by [27] examined a variety of dimensions of aesthetic visual design as well as their role in anticipating the usability of e-learning in northern India. This study established approaches and strategies to make learning content effectively usable, that is, engaging, motivating, interesting, and attractive for the learners, using quantitative means of data gathering. This study verified the importance of consistency, layout, grid, graphics, as typography in predicting e-learning usability but found little significance in color and compositional guidelines.

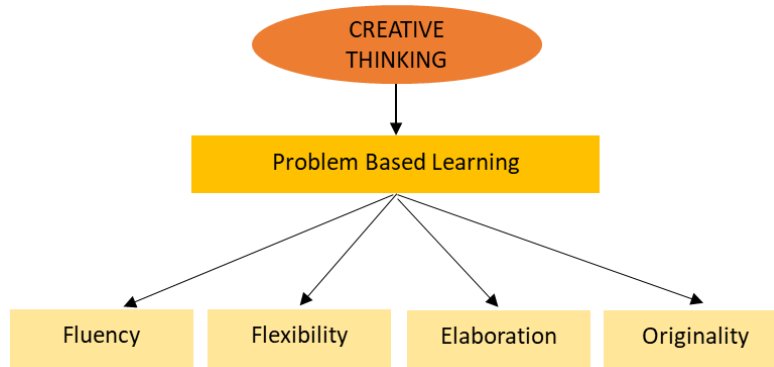


Fig. 3. E-learning based on the Problem-Based Learning (PBL)

The research is useful for course designers who create modules by learning into account visual design features that might encourage engagement with and comprehension of content by online learners. Apart from that, [28] discovered that the dual-primary learning environment model focused on problem-solving is how the computer-environment art design at universities is built, and it may support the development of students' problem-solving skills in the course. The design of problem-solving activities, front-end analysis, and teaching evaluation design are the major components of the teaching model. This research performed an analysis of the existing state of the e-learning platform from many angles, carried out design positioning, and presented a summary of the current problems and redesign. Specific design concepts were created from the structural design, visual interface design, feasibility, and usability analysis results [28]. The research findings showed students do not understand the practical networking technology courses. In this case, before carrying out the teaching practice of the dual-master learning environment model based on problem-solving, teachers must first introduce the content of the teaching of the class and the training of experimental tools, let learners be familiar with the function and role of each module in the simulation experiment tool in advance.

Note that the guides are distributed cognitive theory, activity theory, problem-based philosophy of science theory, instructional design theory, as well as situational cognitive theory. Discussions are also formed through examining different facets of online teaching and learning as well as its effects on the area of visual arts. Social isolation, limited feedback, an emphasis on theory rather than practice, a lack of flexibility, and a lack of transformative force are a few of the topics covered. The best practices for e-learning courses are still being developed. They are considerably more challenging to put into reality, particularly in terms of learning techniques that are appropriate and efficient in all subject areas. Nevertheless, the best practices for teaching and learning in visual arts are practice-based, standard methods, approaches, and processes since they are more developed, well-understood, and efficient [29]. Additionally, e-learning is often only useful as a supplement in the field of visual arts. It emphasizes the development of practical skills since conventional learning is defined by practice-based learning, which is more suitable and efficient. There are five e-learning strategies used in art education are displayed in Figure 4 based on literature reviews. Four strategies required ICT and multimedia technology while PBL measured the ability to think creatively based on originality, elaboration, fluency, and flexibility in conducting e-learning. Moodle system, VR, AR and Smart Classroom suggested current technology that provide dynamic interaction between the student and teacher. By developing content digital platform, educators must consider effective content by considering the consistency, layout, grid, graphics, as well as typography. These elements will create the content to be engaging, motivating, interesting, and attractive for the learners.

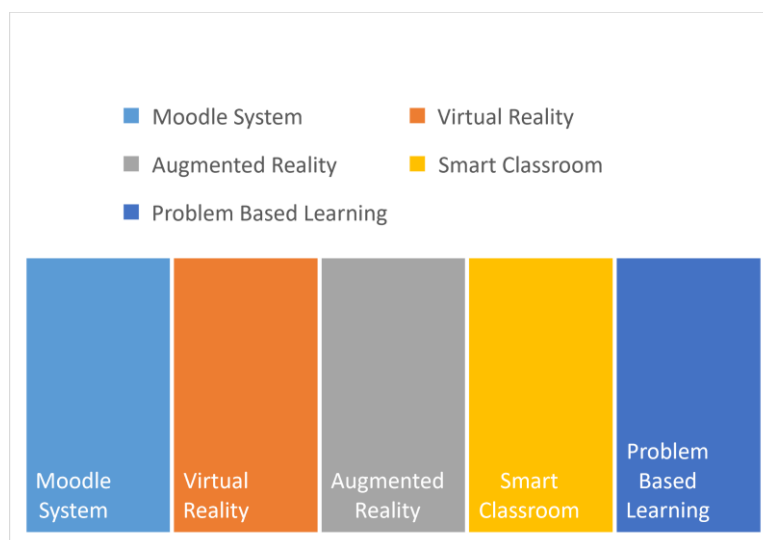


Fig. 4. Five types of e-learning strategy in art education

3.2 Experiences of e-learning in Art Education

E-learning encompasses a variety of media formats that transmit text, audio, images, animation, and streaming video, as well as technology applications and processes like audio or video tapes, computer-based learning, CD-ROMs, satellite TV, local intranet/extranet, as well as web-based learning. The global e-learning market is important economically. Fine arts and media art have emerged as significant genres for children in the twenty-first century. Without question, early exposure to the visual arts provides children with a strong vocabulary to communicate their aesthetic, creative, and cognitive ideas via the use of symbolic representations [30]. Moreover, e-learning is primarily enabled by advancements in the internet and multimedia technologies. There are five primary areas of the e-learning industry: consulting, content, technology, services, and support. E-learning may be utilized in conjunction with in-person teaching in the classroom, as well as distance learning and flexible learning [31]. In Akure South Local Government in Ondo State, secondary school students' views toward learning art using ICT resources were evaluated.

From four schools in Ondo state's Akure South local government area, 200 students were chosen at random. The study's research instrument was the Students Attitude Towards ICT (SATICT) questionnaire. The researchers reported that both female and male students have a favourable attitude toward learning art utilizing ICT resources. Consequently, it was advised that the secondary school art curriculum incorporate ICT into the teaching of art [32]. As mentioned above, using symbolic representations, media art has developed into a significant and powerful language for children. Numerous schools are delaying the adoption of digital arts since the topic of digital play in early childhood education is still divisive. Digital devices that are open-ended (for example, video recorders, cameras, and tablet computers) may enable children to generate more creative content. For instance, drawings, photos, and films, according to a number of international scholars who have studied how digital technologies pertain to children's learning experiences at school. Furthermore, the researchers used digital devices during a summer workshop in Hong Kong on video production to examine the function of video art in early visual arts education. It then used the digital play framework to gather the data. The results demonstrated that the children who took part were capable of using epistemic play to investigate the professional device [30]. Figure 5 portrays the process of creating a digital play session.

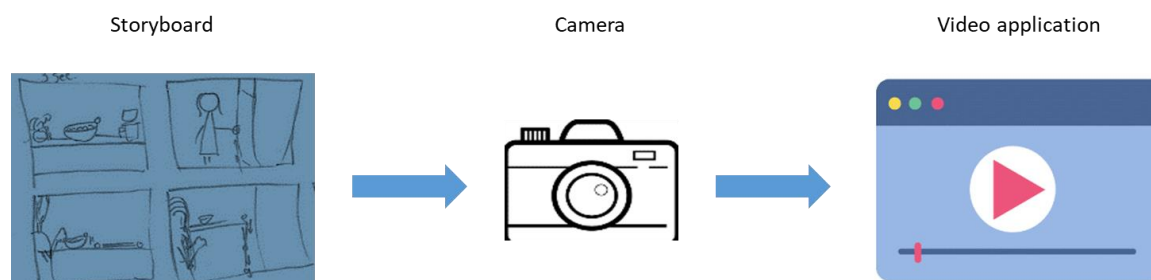


Fig. 5. Digital Play Process

In research by [33], e-studio workshops were utilized, in which the mentor and participants virtually interacted as if they were present in the same room. They may still talk to each other by utilizing audio-video conferencing to connect them, with all aspects of live interaction still in this alternate choice. There are no various perspectives from different angles, as there would be, in real space, of the image on the screen that participants are requested to draw. This involves technical adaptations, which are discussed in this article, and modifies the interaction with the model. Adapting the way knowledge is supplied to individuals with various needs, bringing distance learning closer to workshop providers, determining the best way to improve drawing skills remotely, discovering software that permits quality corrections, and facilitating social interaction between participants and the mentor were some of the project's objectives. A new way of thinking about drawing instruction and the experience of drawing from a model was made possible by this strategy [33]. Meanwhile, a study by [31] studied VR museums through object and representation. Teachers of visual arts in both secondary and primary schools are the focus of this investigation [34]. The research was conducted over the course of seven months in the provinces of Denizli, Mersin, Giresun, Diyarbakr, Kayseri, Erzincan, and Anakale, which were chosen from seven different areas of Turkey.

The survey involved 508 visual arts teachers from secondary and primary schools. According to the findings, the activity improved teachers' learning opportunities in both professional and personal settings. Although teachers emphasized that VR museum experiences could not provide significantly more rich experiences than the actual museum visits, they considered that it might be beneficial for visual arts classes and be incorporated with different learning activities, granted that the virtual museum experience allows for the learning of a museum without a distance barrier and stimulates curiosity and interest through digital technologies (for example, motion, sound, immersive experience) [34]. The study by [35] analyzed the users' experiences processing visual media with respect to online and creative learning via Instagram. The objectives were to evaluate the impact of creative and e-learning utilizing Instagram on the capacity to produce new products in the technology and learning media course, as well as to ascertain the degree of users' expertise in processing visual media using the Android Canva app. Since the post-test was administered to 58 students as respondents in two experimental and control classes, the quantitative technique used in this study was conducted using a quasi-experimental research model. The cognitive learning outcome questionnaire adapted to the subject was utilized in this research to gauge students' capacity for innovation. Meanwhile, the second instrument was adapted from the Indonesian version via eq-online.org to gauge users' familiarity with processing visual media. One-way Analysis of Variance (ANOVA), mean, and standard deviation were used to evaluate the data with help from IBM Statistical Package for the Social Sciences (SPSS) version 24.0.

The findings showed that the Technology and Learning Media course's creative and e-learning utilizing Instagram had a significance of 0.028 on students' capacity to produce new products [35]. Students were able to process their own visual media which were tailored to the agreed digital visual designs and were published on Instagram. Instagram can be used for online learning because it has

some supported tools such as streaming, IGTV, visual worksheets, comment boxes, and stories storage sheets. Instagram fosters positive experience for students who learn product design. From the literature, art students gain positive experience in e-learning through internet and multimedia technology creatively. This can be seen from the e-studio technology by utilizing audio-video conferencing to connect participant in online drawing class. The visual arts classes are created with different learning activities allowing learners to explore and experience art for example using virtual museum to stimulates curiosity and interest through digital technologies. Social media platform also gives the possibility to the students to create digital content on their own and publish it online. The e-learning activities in art education involved the digital media art exploration, virtual interaction with both teacher and student, distance visual communication and social media interaction.

4. Discussion and Conclusion

Research about e-learning or also known as online teaching and learning is in its infancy. There are numerous questions and issues that have not been researched. Although the technology will certainly change in ways that cannot be predicted, the fundamental idea of teaching and learning through a medium that separate participants in time and space is perhaps independent of the exact nature of the technology. These changes affect the quality and functions of art education directly and indirectly. From the reviews, Augmented Reality (AR) is an interactive technology that reshapes the classroom learning environments by providing a means to interact with the course and the instructor dynamically. The learning process can be made more effective, efficient, and expressive when AR is implemented in education. Recently, many research efforts have been made for merging AR with teaching because of its ability to provide an immersive and interactive environment. The training structure is applying outdated strategies that keep schools from moving to competency-based models. Since most of the parts are instructor-oriented, the students are the detached party in the classroom which prompts less communication between students and the instructor. Augmented Reality (AR) is an interactive technology that reshapes the classroom learning environments by providing a means to interact with the course and the instructor dynamically [36–38].

Classes in art and design entail practical exercises and specifications that are difficult to fulfill in digital settings. VR technology's appeal has steadily spread beyond the computer industry to many areas of life. It has evolved into a new method of creating digital media art. New tools and techniques are being given in education to improve teaching and learning due to the development of digital technology [39]. The reviews indicate that transforming traditional classrooms into smart learning spaces using a combination of technologies: uses time more effectively increased efficiencies in the delivery of the curriculum and address individual learning needs. The above reviews also provide a guidance for educator who develop modules by considering visual design elements that can facilitate interaction with and understanding of content by students learning in an online modality. Developing a truly effective online learning course requires time, money, and a huge amount of expertise. Good online learning courses involve multimedia, specialized web development, technical support, and strong user interaction design. If done incorrectly, it will disrupt and negatively impact the learning process, concentrations and space limitations. The best practices for e-learning courses are still evolving and are much more difficult to implement especially in terms of learning methods that would be suitable and effective for all areas. Direct training, standard methods, approaches and processes through practice-based are the best practices and are much more established. We recommend for future research to look at moderating variables with attitudes, or behavior of e-learning among students, also research on the development of e-learning content and learning assessment strategy in art education.

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