A Systematic Review of Interactive Multimedia-based Learning: an Effective Strategy of Teaching Art History

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Systematic Review

Keywords: Interactive Multimedia, Art History, Computer-based instruction

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A SYSTEMATIC REVIEW OF INTERACTIVE MULTIMEDIA-BASED LEARNING: AN EFFECTIVE STRATEGY OF TEACHING ART HISTORY

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Abstract

**Background:** Interactive multimedia, a dynamic technology, requires users’ input to deliver information through words, graphics, images, or videos. Educational research on Interactive Multimedia is scattered throughout the literature. This dispersion is a problem for teachers and students who intend to use technology as a means to teach and learn; hence, to assist them, this research is being undertaken to put the information on Interactive Multimedia together. The research focuses on the following:

a) The effects of the instructions given under the Interactive Multimedia on the learning outcomes of students and
b) The concerns, trends, and gaps that will guide future Interactive Multimedia research and development.

**Main Body:** The review identified fifteen (15) journal articles from five (5) publishers published between January 2011 and December 2021 using the four-step Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach. Science Direct, Taylor and Francis, Emerald, Academia and PLOS ONE, were used to carry out the search. Observations into the educational application of Interactive Multimedia were made through tabular analysis.

**Conclusion:** This review shows that when Interactive Multimedia is used in all disciplines of education, whether formal or informal, it enhances student performance, satisfaction, and participation. Interactive Multimedia is increasingly used as a platform to teach complex things and harness students' understanding. Therefore, more qualitative research on the use of Interactive Multimedia is necessary, especially when studying educators' viewpoints. Further research is needed to apply educational theories into course design using Interactive Multimedia.
Keywords: Interactive Multimedia, Art History, Computer-based instruction

Background

Technology plays a major role in society. Montrieux et al. (2015) assert that Information Communication and Technology provides a vital means to make teachers more innovative and shift from teacher-centred to a learner-centred teaching method. It changes the way students learn because Interactive Multimedia creates an interactive and stimulating new environment. Interactive multimedia, being a dynamic technology, takes input from users to offer a collection of information through words, graphics, photos, or videos.

Main text

Rationale

Since the inception of Interactive Multimedia, a lot of studies have been made on its usefulness in teaching and learning. According to Abtahi (2012), the use of Interactive Multimedia is to arouse new needs and interests, as well as to provide motivation and stimulation of learning activities, or to demonstrate concepts and ensure that pupils gain long-term memory from the content presented. Martin (2020) argues that History is a study of previous events that may be confirmed by genuine evidence which is examined in the present and utilised as a reference for future subjects. In effect, teaching history without the requisite teaching aids makes the lesson boring and too abstract for students to grasp. This then makes it necessary for the teacher to use a method that will make the lesson more interesting to the student; hence, this systematic review examines the effects of the instructions given under the Interactive Multimedia on the learning outcomes of students and the concerns, trends, and gaps that will guide future Interactive Multimedia
research and development. This move synchronises with the opinion of Abdulrahman et al. (2020 p. 2) that:

“Multimedia technology helps simplify abstract content, allows for differences from individuals and allows for coordination of diverse representation with a different perspective.”

The study of art history requires the examination of complex visual images and the interpretation of the historical and cultural contexts in which they were produced (Watson Cunning, 2017). Traditional methods of teaching art history, such as lectures and textbook readings, can be limiting in their ability to convey the richness and complexity of visual art. In recent years, interactive multimedia has emerged as a promising tool for enhancing the teaching and learning of art history (Yulifar and Agustina, 2020). This systematic review aims at examining the use of interactive multimedia to teach art history.

The outcome of this study will provide valuable insights into the impact of interactive multimedia on learners. This can serve as a valuable resource for educators, instructional designers, and researchers interested in incorporating interactive multimedia into their art history curriculum.

Methods

Search Strategy

Journals from the following publishers were used to conduct the search: Taylor and Francis, Sage, PLOS ONE, Science Direct, Emerald, Academia. These were selected because they are regarded as being credible and of high-quality so they are deemed acceptable bibliographic sources for journals, conference papers and other publications.
The data searched from these databases were on the use of Interactive Multimedia to strengthen the teaching and learning of Art History. The databases comprised books, reviews, journal articles and a lot more but the information searched for were all from journal articles. All searches from them spanned from January, 2011 to December, 2021.

Protocol and Eligibility Criteria

The number of studies on Interactive Multimedia for teaching has increased dramatically. Several significant research questions have arisen from a plethora of results and definitions out of which this research will focus on those listed below:

a) How can an Interactive Multimedia be developed for the teaching and learning of the Art History section of GKA?

b) To what extent can an Interactive Multimedia enhance the learning outcomes of students who are offering GKA?

To address the research questions, the researcher made a systematic review of fifteen (15) papers that were published between January 2011 and December 2021. The PRISMA guidelines were followed. To start with, these publications were made part of the systematic review under the requirements outlined below:

a) They must be written in English.

b) They must be indexed in any of the already stated five databases and search engines.
Secondly, the researcher looked at the papers that dealt mainly with Interactive Multimedia in teaching. Some of the studies aimed at using Interactive Multimedia but they were on different constructs, not on education. Upon this, the researcher eliminated them from the study.

There were times when the expression “multimedia” came up in both the title and abstract, while the conceptual framework and research tool were geared towards different topics which did not relate to Interactive Multimedia for teaching. Those papers were also omitted. Besides this, the researchers excluded those studies whose results were highly unclear and thus precluded me from understanding what was reported.

Kwon et al. (2015) suggest diverse de-duplication methods based on the capability of the searcher and the goal of de-duplication efforts.” This means that in systematic review searches, the searcher should detect and eliminate duplicate records. As a result, dealing with duplicate studies is critical to systematic reviews. Based on this, the researchers carefully removed all the duplicates one after the other. The process that the researchers went through is shown in Figure 1.
Selection Criteria

The PRISMA Framework served as the basis for the selection criteria (Moher et al., 2009). The study was primarily concerned with mapping available literature on Interactive Multimedia in the field of education. The search was then narrowed down to Art and History. The research was not limited to particular countries so papers from almost every country was included. A total of 248 records was extracted.

2.4 Publications within the Period

Many studies on Interactive Multimedia Assessments have been published in fields such as education, science, technology, and engineering. The number of publications on
Interactive Multimedia for teaching which were selected from each year during the period under review are as shown in table 1.

Table 1: Table of publications selected

<table>
<thead>
<tr>
<th>Year of Publication</th>
<th>Number of Publications</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>2</td>
</tr>
<tr>
<td>2012</td>
<td>1</td>
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<td>2013</td>
<td>1</td>
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<td>2014</td>
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<tr>
<td>2017</td>
<td>5</td>
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<tr>
<td>2018</td>
<td>1</td>
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<tr>
<td>2019</td>
<td>0</td>
</tr>
<tr>
<td>2020</td>
<td>2</td>
</tr>
<tr>
<td>2021</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total publications</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

Figure 2: shows the number of publications selected from each year.
Figure 2: Graph of publications Selected
Source: Developed by the researcher

Quality Assessment

Only published research articles were used in the investigation. All duplications were thoroughly assessed to be sure the value of the review. To be sure of the exceptional quality of the academic literature used in the review process, the abstracts of publications included were well-reviewed and analysed. Each study paper was subjected to thorough examination.

Data Extraction and Analysis

Before analysing the effectiveness of the use of Interactive Multimedia, it is necessary to go through some general data on existing studies. This process will help to get a global picture of the use of Interactive Multimedia. Such an exploration was made and the data in Table 2. below came up:
### Table 2.: Data collected on the exploration of studies made on the use of Interactive Multimedia

<table>
<thead>
<tr>
<th>Authors</th>
<th>Year of Publication</th>
<th>Design/ Approach</th>
<th>Location/ Study Site</th>
<th>Participants/ Subjects</th>
<th>Measures</th>
<th>Procedure</th>
<th>Data Analysis Plan</th>
<th>Main Findings</th>
<th>Practical/ Theoretical Implications</th>
<th>Suggestions for future studies</th>
<th>References Cited</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieben et al.</td>
<td>2017</td>
<td>Online survey</td>
<td>University of Dundee</td>
<td>Undergraduate medical students</td>
<td>Online survey (n=37)</td>
<td>Online survey was used to conduct a preliminary review (n=37).</td>
<td>On the website, the resource received positive feedback.</td>
<td>According to the findings, an interactive 3D model can fill the gap between microscope pictures and the 3D tissues they depict.</td>
<td>According to the findings, a self-study tool increases teaching and learning on a complex topic in medical curricula.</td>
<td>It is worthwhile to examine further visualisation of various types of cell tissues using 3D modelling.</td>
<td>Sieben et al. (2017)</td>
</tr>
<tr>
<td>Vial et al.</td>
<td>2015</td>
<td>Internet multimedia and interactive resources</td>
<td>Australian university</td>
<td>Students at an Australian university</td>
<td>Students from the previous year were compared to those from the most recent edition of the telecommunications laboratory in 2011 and 2012.</td>
<td>During each laboratory session, each demonstrator was asked 12 questions.</td>
<td>The impact of the new multimedia resource was also assessed via student assessment</td>
<td>According to the findings of the study, online teaching materials significantly improved the students' learning experiences.</td>
<td>The online teaching material was effective two years in a row, demonstrating that this improvement will continue to benefit students regardless of the presence of the teaching staff.</td>
<td>Lessons learnt can be applied to other comparable learning situations.</td>
<td>Vial et al. (2015)</td>
</tr>
<tr>
<td>Chong and Smith</td>
<td>2017</td>
<td>Online survey</td>
<td>United States</td>
<td>225 websites of cultural institutions selected from the United States</td>
<td>Online survey</td>
<td>The entries were classified according to the American Alliance of Museums' six geographic regions (AAM).</td>
<td>Among the fields researched were arboretums, botanical gardens, nature centres, natural history and natural science museums, science and technology museums, planetariums, zoos,</td>
<td>Only 5% of the 225 websites from selected US cultural institutions with informal science teaching offer interactive learning opportunities.</td>
<td>Any museum can generate special interactive material through utilizing both underutilized and extensively used resources.</td>
<td>Further research into the qualities of a digital platform which can assist the construction of interactive learning modules on museum</td>
<td>Chong and Smith (2017)</td>
</tr>
<tr>
<td>Study Authors and Year</td>
<td>Methodology</td>
<td>Context</td>
<td>Intervention</td>
<td>Evaluation</td>
<td>Findings</td>
<td>Conclusion</td>
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<td>Shanthy and Thiagarajan (2011)</td>
<td>Control group experimentation with pre- and post-testing</td>
<td>Tamil Nadu state, India</td>
<td>Sugarcane farmers in three Tamil Nadu villages, India</td>
<td>The message was delivered in three ways: traditional lecture alone, lecture followed by multimedia, and multimedia alone. These were assessed for effectiveness in terms of knowledge acquisition, learning score, and level of assimilation.</td>
<td>Surveys were done during two farming seasons, and the data were analysed.</td>
<td>The group that received education via lecture followed by computer multimedia had a higher rate of retention.</td>
<td>More research on the future prospects of multimedia use in India could be conducted.</td>
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<tr>
<td>Abtahi (2012)</td>
<td>Qualitative approaches</td>
<td>Iran</td>
<td>Children who are dyslexic</td>
<td>Mock-ups of learning objects, observation lists, interviews, and video recording</td>
<td>The researchers employed the think aloud approach for usability testing.</td>
<td>The data was analysed using observation lists, interviews, and video recordings.</td>
<td>According to the findings, IMLO is an effective teaching tool to be used for dyslexic youngsters.</td>
<td>More prototypes, such as the IMLO, are needed to break down content into simple steps for dyslexic children to understand.</td>
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<tr>
<td>Maaruf and Siraj (2013)</td>
<td>Developmental research design</td>
<td>Malaysian educational institutions</td>
<td>Sixty multi-ethnic secondary school students and two arts education teachers</td>
<td>A developmental research design was used, in addition to samples of sixty secondary school students from diverse ethnicities and two teachers who teach arts education.</td>
<td>Data acquired from interview sessions during implementation and evaluation were analysed using narrative analysis.</td>
<td>The paper uses interactive multimedia as teaching methods and materials to improve culturally sensitive pedagogical modules.</td>
<td>Workshop experiences with in-depth understanding should be provided to help teachers use new technology in their employment.</td>
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<tr>
<td>Khan and Masood</td>
<td>2014</td>
<td>Multimedia-assisted Mastery Learning (MML), Multimedia-Assisted Cooperative Learning (MCL) and Multimedia-Assisted Cooperative Mastery Learning (MCML)</td>
<td>Malaysia</td>
<td>Pre-university students numbered 84, 88, and 90, respectively</td>
<td>Multimedia-assisted Cooperative Learning (MCL), Multimedia-assisted Cooperative Mastery Learning (MCML) and Multimedia-assisted Mastery Learning (MML), respectively</td>
<td>When compared to MCL, MML, and MCML, students performed significantly better in the generation of a domain score.</td>
<td>The outcomes of this study suggest that interactive multimedia courseware using a combination of mastery and cooperative learning approaches promotes Cellular Respiration learning.</td>
<td>Khan and Masood (2014)</td>
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<td>Abdulrahman et al.</td>
<td>2020</td>
<td>The incorporation of multimedia resources into the teaching and learning processes</td>
<td>Nigeria</td>
<td>PRISMA-P</td>
<td>The study used research strategy which includes a process of identifying papers to be examined in order to solve a specific research problem.</td>
<td>The effectiveness of a systematic review begins from the data sources utilized to choose the articles for evaluation.</td>
<td>To fulfil the goals of multimedia tools in education, its use must be carefully specified and structured.</td>
<td>According to the findings, the majority of multimedia solutions used for teaching and learning focuses on the pedagogical substance of the subject of interest as well as the solution's user audience.</td>
<td>To improve teaching and learning processes for a varied range of students, steps should be taken to research mobile technology with a variety of multimedia components.</td>
<td>Abdulrahman et al. (2020)</td>
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</tr>
<tr>
<td>Quattrini et al.</td>
<td>2020</td>
<td>Quantitative and qualitative approaches</td>
<td>Italy</td>
<td>Users across the world who visit the virtual museum</td>
<td>To understand consumers' interaction, a digital multimedia was created and data was collected.</td>
<td>The necessary data for evaluating the 3D models were gathered through front-end assessment actions, such as the formation of focus groups with a set of target users represented by secondary school students.</td>
<td>The results reveal that the proposed approach delivers meaningful data to insiders and art curators in order to study the users and, as a result, set up new strategies for real and virtual exhibitions.</td>
<td>The work describes various multimedia experiences from the perspective of the users. It also demonstrates their understanding of their engagement with multimedia.</td>
<td>Future work will aim at reducing the use of pencil-and-pen approach by improving data collection strategies using digital tools.</td>
<td>Quattrini et al. (2020)</td>
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<tr>
<td>Authors</td>
<td>Year</td>
<td>Study Type</td>
<td>Location</td>
<td>Participants</td>
<td>Methods / Data Collection</td>
<td>Findings</td>
<td>Next Steps</td>
<td>References</td>
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<td>Adom et al.</td>
<td>2016</td>
<td>Descriptive research method and document analysis</td>
<td>General not specific</td>
<td>Second cycle and tertiary students</td>
<td>Several instructional strategies were suggested and their usefulness explained.</td>
<td>Semi-structured interviews and non-participant observation were used to collect data for the study.</td>
<td>According to the study, low student performance in art history is caused by wrongly chosen methodologies or inadequate instructional strategies and approaches.</td>
<td>The study suggests that good instructional methods and strategies for teaching art history can increase teachers' and students' interest in art history while favourably impacting learning outcomes.</td>
<td>Adom et al. (2016)</td>
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<tr>
<td>Karime et al.</td>
<td>2011</td>
<td>General not specific</td>
<td>Canada</td>
<td>Children of various ages</td>
<td>Created an interactive educational system that leverages multimedia technology to increase children's learning by displaying various media connected to an object when they tap on it.</td>
<td>Developed an edutainment system that uses multimedia technology to increase children's learning by showing a variety of media connected to a certain object.</td>
<td>The designed multimedia was incorporated into three games that allowed children of varying ages to benefit from the system's features and encouraged them to interact with it.</td>
<td>The study indicates that children quickly grasped the concept of the Magic Stick and participated with their classmates via dialogues and idea exchange.</td>
<td>Integration of an LCD screen and a small speaker into the Magic Stick so that children can see and hear the names of items even when they are far away from the computer.</td>
<td>Karime et al. (2011)</td>
<td></td>
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<tr>
<td>Martin</td>
<td>2020</td>
<td>Technology in cataloguing</td>
<td>Digital Museum</td>
<td>Bringing together the most recent advances in costume data and photos to make history</td>
<td>Institutional websites, image banks, and social media are the most primary places to find photographs of dresses online.</td>
<td>Most common places to find photographs online</td>
<td>The article covers recent work in the fields of fashion archives and demonstrates the value of heritage in developing new design and display practices that are still relevant today.</td>
<td>The paper discusses how digital technology might provide new methods and tools for museum archives and exhibitions.</td>
<td>Martin (2018)</td>
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<tr>
<td>DeSantis et al.</td>
<td>2017</td>
<td>Quasi-experimental research project</td>
<td>South Central Pennsylvania's rural high school, USA</td>
<td>The research included 77 respondents with ages ranging</td>
<td>Content and historical thinking survey (CHTS)</td>
<td>Before the content was introduced, learners completed the content and historical thinking survey (CHTS) to assess their knowledge and skills.</td>
<td>Participants from both synchronous and asynchronous populations performed the CHTS on the first day of the study.</td>
<td>According to the findings of this study, both synchronous and asynchronous technology-enhanced lectures are effective in developing new design and display practices that are still relevant today.</td>
<td>Students that participated in synchronous technology-integrated education demonstrated more confidence in the Future research could examine if there are differences in how students learn when they use content.</td>
<td>DeSantis et al. (2017)</td>
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<tr>
<td>Study</td>
<td>Year</td>
<td>Methodology</td>
<td>Country</td>
<td>Participants</td>
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<td>Watson-Canning</td>
<td>2017</td>
<td>Constructivist learning and technology integration</td>
<td>Virtual</td>
<td>Visual Thinking Skill (VTS)</td>
<td></td>
<td></td>
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<tr>
<td>Montrieux et al.</td>
<td>2015</td>
<td>Focus group experimentation</td>
<td>Belgium</td>
<td>Eighteen Secondary school teachers and thirty-nine students</td>
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</table>

Source: Developed by the researcher

from 14 to 18 years. prior to exploring the history content offered in the courses. pedagogies for boosting a student's understanding. lesson's ability to instruct them when compared to the asynchronous group. delivery systems, both synchronous and asynchronous, for an entire unit or semester.

The study explains how using artwork collections that have been digitized engage students. To stay relevant, teachers must use the internet to help students improve their analytical and evaluative abilities. The research offers a versatile approach to combining technology and art into social studies classroom practice so as to increase visual literacy, historical knowledge, and evidence-based research abilities.

According to the findings of this study, employing tablet devices in the classroom has an influence on both the teaching and learning process. The findings revealed that teachers can be categorised into two types: innovative teachers and instrumental teachers. More empirical research is required to gain a better understanding of how contemporary technologies affect teaching and learning.

Results

Description of articles extracted

The results obtained from the search showed that 36% of the articles were obtained from Science Direct, 14% from Academia, 7% from PLOS ONE, 27% from Taylor and Francis with 20% coming from Emerald. Table 3 explains the results obtained from the searches.

Table 3: Sources of information of the 15 journal articles deemed suitable for review

<table>
<thead>
<tr>
<th>Database</th>
<th>No. of Articles</th>
<th>% Obtained</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academia</td>
<td>2</td>
<td>13</td>
<td>Karime et al. (2011), Adom et al. (2016),</td>
</tr>
<tr>
<td>PLOS ONE</td>
<td>1</td>
<td>7</td>
<td>Montrieux et al. (2015)</td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>100</td>
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</tbody>
</table>

Source: Developed by the researcher
Multimedia Tools used in some research works

In the research by Abathi (2012), the interactive Multimedia Learning Object (IMLO) was created utilizing a multi-sensory approach to interactive multimedia and instructional technology. Maaruf and Siraj (2013) created the interactive multimedia primarily with the Microsoft PowerPoint 2010 software. This programme was chosen for its benefits of being a universal software which all computer users can easily access. The Microsoft PowerPoint 2010 software was used for the purposes of creating interactive multimedia to respond to the cultural needs of teaching the traditional craft in Visual Art Education in high schools; allowing teachers to actively get engaged in the improvement process as co-designers; allowing teachers to gain direct exposure to the designed interactive multimedia; and regularly adding new information. Khan and Masood (2014) used Adobe Flash CS4 as the primary authoring tool to create the multimedia interactive courseware named "Cellular Respiration". Rapid prototyping
was used to generate a set of templates. The mastery learning aspects of the instructional material were developed to be used in the Multimedia-assisted Mastery Learning (MML) and Multimedia-assisted Cooperative Mastery Learning (MCML) techniques. The same instructional materials were used by learners in all three modes of learning. The MML learned independently, whereas the MCL and MCML were put into groups. The mastery learning elements were incorporated in the MML and MCML instructional material, whereas the MCL did not include them. Quattrini et al (2020) created a web platform and mobile app were created to showcase contents and preview sites and findings via web omnipresent systems, allowing users to use 360 Virtual Tour, 360 Video, and 3D digital artifacts displayed in the Digital Library. Watson Cunning (2017) created a lesson plan about Renaissance humanism and how it comes out in art using images from the National Gallery of Art and Visual Thinking Strategies.

**Effects on learning outcomes**

In the research by Abathi (2012) the study found evidence that dyslexic children enjoyed learning with the Interactive Multimedia Learning Object (IMLO). Maaruf and Siraj (2013) revealed that teachers’ involvement in the development of the technology helps them to be more culturally tolerant and also improves teachers’ information technology skills. It accelerates teaching and learning and helps to increase student involvement in the learning process. Khan and Masood (2014) identified that, in the generating domain score, MML and MCML students outperformed MCL students substantially. On the whole, the outcomes of this research suggest that the courseware for interactive multimedia is beneficial since combining mastery and cooperative learning methodologies increases Cellular Respiration learning. From the standpoint of the user, Quattrini et al. (2020) argue that the data show that digital services are the only tools capable of conveying information in a timely and fast manner. Adom et al.
(2016) discovered that the root of the problem is inadequate instructional strategies utilized by diverse Art History teachers in the majority of senior and tertiary institutions. Thus, the findings of the study have suggested time-tested and feasible instructional strategies and approaches that can boost the interest and performance of art history students and teachers.

**Discussion**

Throughout the entire search, the researcher arrived at the following:

❖ Interactive Multimedia aids in deeper comprehension of content taught at every level of education. Vial et al. (2015) and Sieben et al. (2017) report that the performance of students increased with the introduction of interactive multimedia in the course content at the University. Karime et al. (2011) and Abathi (2012) revealed that the use of interactive multimedia to teach children helps them to grasp concepts easily.

❖ The inputs of the participants are key in developing the Interactive Multimedia. The inputs aid participants’ understanding of the content of the multimedia (Shanthy and Thiagarajan, 2011). Shanthy and Thiagarajan involved farmers in the development of the Interactive Multimedia. A survey was conducted after the introduction of the multimedia and it was revealed that participants who received instructions via lecture followed by computer multimedia had a higher rate of retention.

❖ The researchers looked at the long-term results generated by the research.

❖ The findings from Chong and Smith (2017), Quattrini et al. (2020) and Martin (2018) revealed that technology helps to establish a balance by the use of Interactive Multimedia to create virtual spaces such as virtual museums which provide leisure and learning in the museum. This helps to harness the cultural heritage of a people.
Conclusions

This thorough systematic study of Interactive Multimedia used for Art History teaching and learning covers multiple educational institutions. The review identifies methodologies and developments reported in five (5) databases and fifteen (15) scientific publications during the last ten years. The findings have been tabulated to give educators, academics, and Interactive Multimedia producers important information.

The tabular analysis employed in table 2 identified Interactive Multimedia as a well-established and comprehensive learning platform for numerous disciplines, and it is especially used in education to help learners absorb topics more quickly. This observation confirms what has been proved in the research that Interactive Multimedia in teaching has improved dramatically. A highly cited work by Zhang (2005) with 386 citations revealed the use of Interactive Multimedia in the Learning By Asking (LBA) system where lectures were videotaped and the instructional videos were logically divided into a number of video clips so that each clip focused on a single sub-topic. In this research, learners could easily skip to other topics they preferred. In recent publications, Interactive Multimedia includes animations which have extended its boundaries.

Both students and teachers benefit from using Interactive Multimedia at varying degrees. Individual teachers' creativity can be developed using interactive multimedia to develop course-specific materials for students. Furthermore, Interactive Multimedia saves time due to automated marking systems of the questions presented by the multimedia, some of which have many viable responses, as well as provide automatic cumulative feedback. There is significant evidence that while enhancing flexibility in learning environments, interactive multimedia promotes student engagement, performance, and satisfaction.
Regardless of the advantages of Interactive Multimedia and current technological developments in teaching and learning, there are some fundamental gaps and limitations in its development and application that require further exploration. This particular research cannot fill the void because of its critical limitation; being, that only Taylor and Francis, Science Direct, PLOS ONE, Emerald and Academia databases were used for the search. The consequence is that the analysis is skewed towards the information from only these databases so it cannot be completely relied on. In addition to this, most of the literature focused on classroom settings with less to nothing on other relevant areas.

**Future Agenda**

Future research should address the gaps noted in this review.

There is a need for further research on the specific pedagogical strategies and design principles that can maximize the effectiveness of interactive multimedia in art history education. Future research should also look for the impact of interactive multimedia on student engagement, motivation, and knowledge retention in art history education.

Another gap is that this research proves that there is dearth in the availability of information on the use of Interactive Multimedia in teaching Art History. This observation is based on the issue that only published articles which were accessed on the use of Interactive Multimedia to teach Art History was limited.

**Search Keywords**

To guarantee that acceptable key search phrases are utilized and related papers are duly picked for the review, the Kitchenham et al. (2009) literature search approach was used. It is
commonly assumed that a search on a main string will result in the search output containing all relevant papers, but this is not always the case, thus, necessitating the use of substrings.

The key words used for the search, ranging from relevant literatures in the academic databases as well as the journals stated in section 2.1 are "interactive multimedia", "interactive multimedia technology", "multimedia technology in education", "ICT impact on education", "interactive multimedia tools in education", "interactive multimedia in teaching", "interactive multimedia in learning" and "digital education".

**Disclosure Statement**

There are no conflicts of interest reported by the authors. The authors are solely responsible for writing the article and its content.

**Abbreviations**

AAM – American Alliance of Museums
CHTS – Content and Historical Thinking Survey
GKA – General Knowledge in Art
LED – Light-Emitting Diode
MCL – Multimedia-assisted Cooperative Learning
MCML – Multimedia-assisted Cooperative Mastery Learning
MML – Multimedia-assisted Mastery Learning
PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses
VTS – Visual Thinking Skill

**Declarations**

**Ethics approval and consent to participate**

Not applicable.
Consent for publication
Not applicable.

Availability of data and materials
The datasets supporting the conclusions of this article are included within the article and its additional files.

Competing interests
The authors declare that they have no competing interests.

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Authors’ Contributions
Dr. Harry Barton Essel's expertise in instructional design and multimedia learning shaped the design of the study's research questions and objectives. Akwasi Adomako Boakye examined the methodology and conclusions of the included studies to determine their quality and relevance. He methodically gathered and synthesized data from the selected research, ensuring that the review contained a comprehensive overview of the effectiveness of interactive multimedia-based learning in the context of art history teaching. Dr. Micheal Ato Essuman critically reviewed the included research, concentrating on the findings’ relevance and usefulness to art history instruction. Ernest Appiah contributed to the analysis of the findings, underlining the importance of interactive multimedia-based learning methodologies in increasing students’ engagement, knowledge, and retention of art historical themes.

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REFERENCES


**Figures**

**Figure 1**

The four-step PRISMA flow chart for the review

Source: Developed by the researcher
Figure 2

Graph of publications Selected

Source: Developed by the researcher
Figure 3

Illustration of Databases used for the systematic review

Source: Developed by the researcher

Supplementary Files

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- Supplementaryfile1.docx