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DISCOURSES ACROSS PERIODS OF TIME:

by

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DISCOURSES ACROSS PERIODS OF TIME: EXPLORING THE USE OF GENERATIVE AI IN DIGITAL HUMANITIES FOR LIVELY INTERACTIONS WITH FRIDA KAHLO AND OTHER HISTORICAL FIGURES

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Thesis Chapters Submitted in Partial Fulfillment of the Requirements in the Degree of a Master Arts in Art History and Visual Culture

Abstract

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Amanda Moreno, Master of Art History and Visual Culture, 2023

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This literature review explores the revolutionary effect of generative artificial intelligence (AI) and virtual reality (VR) on digital art history, specifically concentrating on their capacity to enable dialogical exchanges with historical figures and deepen the understanding of artworks. This study considers the current state of research, detecting key methodologies, areas of improvement, and possible challenges and ethical concerns. The example historical figure used in this analysis is the iconic Mexican artist Frida Kahlo. Kahlo's refusal to correspond to a specific artistic style makes her an ideal subject for generative AI and VR-based investigation, offering fresh insights into her work. The incorporation of generative artificial intelligence and virtual reality technologies in humanities education, particularly in digital art history, has grown meaningful interest such as virtual museum exhibits and interactive art history course assignments offered in some universities. These tools allow immersive learning encounters, permitting students to become involved with art in advanced methods by using devices like Oculus VR. Text-based and image-based generative AI adds significantly to digital art history by producing new perceptions, depictions, and realizations from immense datasets. Additionally, the combination of generative AI and VR opens doors to vivid interactions with historical figures aided by natural language processing algorithms. While this tactic enhances historical and art history education, the following paper acknowledges the obstacles of artificial intelligence reproductions in presenting truthful responses. The paper addresses the ethical concerns linked to generative AI, stressing the importance of responsible usage in art history research. Ultimately, generative AI and VR integration promises to unlock new aspects of knowledge and understanding, further improving language learning, literature study, and cultural examination within the digital humanities.

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Introduction

This thesis examines the role of generative artificial intelligence in digital art history, specifically focusing on its possibility to facilitate lively interactions with historical figures. By reviewing existing literature, this study aims to explore the current state of research; identify key developments, methodologies, and confrontations; and offer a complete understanding of the suggestions and opportunities of generative AI in engaging interactions with historical figures within art history. These components will assist the overall review of artificial intelligence and virtual reality to recreate art historical figures as the example artist and focused historical figure is the Mexican artist Frida Kahlo, accompanied by additional research previously conducted from biographies, articles, and other texts.

Frida Kahlo, a recognized figure in the twentieth-century art world, experienced a life marked by both artistic skill and personal misfortune, as many art historians have examined. The research on Frida Kahlo has concluded that her style is not based on one singular movement at the time of her work. The artistic styles associated with Frida Kahlo's work have been categorized with other artworks in Surrealism, Feminism, Mexican folk art, and various other art movements from this same time period. This can be seen in artworks such as *Henry Ford Hospital* (figure 1), created around the time when Frida suffered the loss of her unborn child, where the floating images of a human fetus, snail, fractured hip bone, purple flower, and a mechanical object are linked to Surrealism. Also, the naked female figure in the center of the work could be seen as related to Feminism to demonstrate women's bodies during a time when female artists were not given a chance to show such revealing angles in the art world. Though the studies conducted by art scholars, such as Kevin Blake, Lis Pankl, and Ellen G. Landau, include one or more of these observations, it can be agreed that Frida Kahlo was an artist who had many personal themes in her

artwork that only she could fully understand. Additionally, Frida Kahlo went through many interviews and discussions about her work, and she would never align herself with a specific art style, like the previous ones mentioned by today's researchers. This is why artificial intelligence and virtual reality could benefit other researchers and those interested in learning more about Frida Kahlo and other vital figures by aiding in the construction of a digital reproduction with the private knowledge of said figures from journals and other intimate documents.

Since the development of computer-generated applications for educational reinforcements, research has been conducted by educators and historians to support the use of artificial intelligence and virtual reality within the range of courses in humanities, such as history and art history classes. Artificial intelligence (AI) and virtual reality (VR) could be used in a classroom setting as tools for teaching art history and assisting students' ability to experience art in novel and immersive ways. AI encompasses using data and computer processes to imitate human knowledge and carry out decisions that usually involve human intellect, such as identifying pictures and conducting assessments. In contrast, VR incorporates atmospheres created by computers mimicking real-world understandings. The use of generative artificial intelligence and virtual reality in digital humanities research and digital art history is of great importance to advance the methods in introducing both fields to the public. Regarding art history, AI can be used to dissect and survey works of art, permitting students to obtain an innate comprehension of their structure, imagery, and social framework. For instance, artificial intelligence systems can interpret the hues and arrangement of Frida Kahlo's artwork in *Henry Ford Hospital* (figure 1) as a narrative of Kahlo's pregnancy loss while visiting Detroit, Michigan in 1932 through 1933, and the emotional state

connected to this moment in her life, as researchers such as Dr. Ellen G. Landau already surmise.[1] Similarly, VR can be used to construct engaging circumstances, letting students discover art in three dimensions, attend museums and galleries virtually, and generate works of art in a simulated space. Artificial intelligence and virtual reality can offer an exclusive and appealing method for students to learn about art history, allowing them to interact with art more individually and meaningfully. With the aid of these technologies, students can discern art from distinctive viewpoints, acquiring a deeper understanding and regard for the art and civilization that shaped it.

Within the artificial intelligence framework, text and image-based generative AI assist digital art history research by producing new perceptions and imagery, revealing unknown patterns, and investigating huge datasets of written and visual data in novel techniques. Text-based generative AI, also referred to as language models, uses systems to inspect and comprehend textual patterns and configurations, letting it generate new text similar in approach and context from the studied examples. An example of using text-based generative AI regarding digital art history could be to search for the correlation between contrasting art methods, such as Feminism and Globalism, seen in another work by Frida Kahlo, *Self Portrait Along the Borderline of Mexico and the United*

[1] As Frida Kahlo was accompanying her husband Diego Rivera on his commission work in the United States, Kahlo became pregnant and endured the loss of her unborn child. Around this time, Kahlo painted *Henry Ford Hospital* in which a depicted fetus, hospital instruments, and other objects could correlate to the event which Kahlo is expressing in her painting. Landau describes Frida Kahlo's work at the time as "typically characterized [from] the miscarriage Kahlo suffered at Detroit's Henry Ford Hospital on July 4th, 1932. Kahlo…described this experience…in a well-known surrealistic painting depicting herself lying in a hospital bed tethered to anatomical models and her fetus, among other related symbolic objects." Ellen G. Landau, "Reviewed Work(s): Diego Rivera and Frida Kahlo in Detroit by Mark Rosenthal: Frida Kahlo's Garden by Adriana Zavala, Mia D'Avanza and Joanna L. Groarke," *Woman's Art Journal* 37, no. 1 (2016): 56, accessed November 1, 2021, https://www.jstor.org/stable/26452058.

States[2] (figure 2). Text-based generative artificial intelligence could also evaluate artists' writings, including correspondences, memoirs, and other private texts, to better appreciate their creative methods, drives, and influences. Image-based generative AI uses algorithms to analyze and acknowledge visual designs and arrangements, allowing new images to be created with analogous techniques and subject to the examples provided. Image-based generative AI could be applied in digital art history to isolate repetitive visual components in historical artworks or study the association between diverse art styles over time. On another occasion, image-based artificial intelligence could be used to identify common color arrangements in the works of a particular artist or movement and analyze the impact of different cultures or historical eras on specific artworks. Altogether, utilizing text-based and image-based generative AI in digital art history has the promise to modernize the understanding and interpretation of educational artifacts and visual culture.

Using both forms of generative artificial intelligence in digital art history and virtual reality can help better understand the past, expand comprehension into the life events of past artists, and create a captivating way for learners to absorb history. One approach to achieve this is using natural language processing (NLP) algorithms to evaluate historical papers and records of discourses and interviews given by the historical figure. This examination can prepare a generative AI model to react to user inputs in a way concordant with the speech and gestures of the historical figure. For instance, a generative AI model could be taught to replicate a discussion with Frida Kahlo,

[2] In this painting, Frida Kahlo stands in the middle of her work, dressed in an elegant outfit, contrary to her iconic Mexican outfits, in an illustrated version of Mexico, with recognizable structures and vegetation, and the US, with its industrial buildings and inventions humanized as soldiers. As educators Lis Pankl and Kevin Blake point out in this painting, Kahlo could be showing "redefined femininity in her work and her life, not just in respect to Mexican society, but on a global scale as well." See Lis Pankl and Kevin Blake, "Made in Her Image: Frida Kahlo as Material Culture," *Material Culture* 44, no. 2 (2012): 11, accessed November 1, 2021, https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=aft&AN=82608971&site=ehost-live.

responding to user inputs from interviews, journal entries, and other transcribed resources consistent with the Mexican painter's language and communication patterns. Using generative artificial intelligence in meaningful interactions with historical personages has several potential benefits and challenges to keep in mind. Apart from being more appealing for students to learn about past figures, generative AI can also help bring history to life in a way that is more memorable than traditional forms of history and art history education. However, it is imperative to note that generative AI reproductions are not flawless, and their replies may not regularly be correct or consistent with the genuine opinions of the historical personage. With careful monitoring and regular revisions to the generative artificial intelligence imitations, this method could assist learners in comprehending history and further developing perceptions into the lives of past artists in an absorbing way.

Overall, generative artificial intelligence is becoming more essential in digital humanities research and digital art history as AI offers novel modes to analyze, envision, and grasp large datasets and produce new digital works of art. In the following literature review, this topic will be discussed further for the role of generative AI in digital art history and its potential for facilitating lively interactions with historical figures. To support this examination, a review of existing literature from professors Andrew Hurley, Claudio Fogu, Jan Jagodzinski, and others will explore the current state of research and identify key trends, methodologies, and challenges. This review will also provide a comprehensive understanding of the implications and opportunities of using generative AI in engaging interactions with historical figures within the context of art history. For digital humanities research, this could pave the way to fresh perceptions and endeavors about historical events, social occurrences, and communal gestures, which have been found in studies conducted by scholars such as researchers and educators Xieling Chen, Di Zhou, Haoran Xie,

Dongping Zheng, Michael Bischoff, Betsy Gilliland, and Gary Cheng, as well as assistant professors Kurt D. Squire and Linda C. Jones. In digital art history, this can lead to creative execution and testing, in addition to the viewer being able to participate with art, as discovered and explained by authors and researchers Mike Levy, Laurence F. Johnson, Alan H. Levine, Steven Eiselen, Caixia Liu, Xinyi Huang, Alison Colman, Pier Augusto Bertacchini, Eleonora Bilotta, Pietro Pantano, Assunta Tavernise, Annette Vowinckel, Jefferson Bailey, and Lily Pregill. The generative artificial intelligence in digital humanities research and digital art history can modernize these departments, broadening new opportunities for analysis, artistic expression, and comprehension.

Literature Review

Importance of Digital Tools in Broadening Humanities Studies

As discussed previously, generative artificial intelligence alludes to using computer learning systems to generate new information in contemporary data. Regarding digital humanities research, generative AI could produce original transcripts, pictures, and visual and audial recordings similar to present representations. This technique is already being practiced to better apprehend certain periods by recreating images related to a chosen era.[3] As Professor Hurley states, "Eleven computer models of downtown St. Louis, spanning the decades from 1850 to 1950, served as a 3D Exploratorium for American history[.] Website guests pieced together the meaning of significant historical developments…and collect[ed] fragments of information about people, places, and events."[4] Here, Hurley supports his argument of embracing these AI technologies and working to address any challenges of privacy or data security, so educators and schools can create a more engaging and effective learning environment for students. This similar recreation could be applied to the time in which Frida Kahlo was raised, around the time of the Mexican Revolution of 1910,[5] so users could experience related events as the artist did to comprehend her cultural

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[3] This technique is seen and mentioned in University of Missouri's Professor of History, Andrew Hurley, and his article, "Chasing the Frontiers of Digital Technology."

[4] Andrew Hurley, "Chasing the Frontiers of Digital Technology," *The Public Historian* 38, no. 1 (2016): 72, accessed February 02, 2023, https://www.jstor.org/stable/10.2307/26420756.

[5] Before the revolution, Mexico was run by the dictatorship of President Porfirio Díaz, who favored wealthy landowners over the so-called peasants and indigenous people. After three decades of small-town rebellions, presidential and rebel assassinations, and millions of lives lost, Mexico was on the way to recovery, thanks to a leader who understood the culture of the lower middle class and was an educated, hard-working man, President Lázaro Cárdenas. Though the political feud was slowly dying, many Mexican people could not forget the struggle endured during Díaz's dictatorship, the amendments to the 1857 constitution, and the implementation of these changes, especially Frida Kahlo, born a few years before the revolution. See Lynn V. Foster, "The Revolution of 1910 (1910 1940)," *In A Brief History of Mexico*, October 26, 2021, https://go.openathens.net/redirector/lindenwood.edu?url=https%3A%2F%2Fsearch.credoreferen

points of view reflected in some of her work. Another example of generative artificial intelligence being used to recreate a moment in history using previous documents digitally could be seen in a fellow Professor of History, Claudio Fogu's, "Digitalizing Historical Consciousness." Dr. Fogu's article mentions recreating the social impacts of the September 11 attacks on the United States in 2001 using past articles, films, and other significant media. Fogu writes how "The *September 11 Digital Archive*…realizes the democratic mission of digitalization by consisting exclusively of document files[,]…emails, videos, images, and audio files [which]…seems to equate history *with* experience rather than action, and to witnessing rather than making."[6] In this section of Professor Fogu's article, the author reinforces the overall idea of his findings on how digital technologies, such as artificial intelligence, have the potential to transform the engagement with history, providing new tools and resources for exploring and interpreting the past. Though the use of generative AI in research must be carefully considered to avoid potential risks, and ethically managed by limiting its use, the potential in digital humanities research opens up new avenues of exploration and understanding in fields such as history and culture.

The growing field of digital art history is vital to the study of art history for a few reasons, as it requires the additional resource of discussions with historical personages with the aid of generative artificial intelligence and virtual reality. First, digital art history permits the investigation and conception of large data sets--in this case, various artworks or reviews on said artwork--perhaps complicated or tedious to study using traditional methods. In Professor Jan Jagodzinski's article, the author mentions that art is seen through the commonly known elements

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ce.com%2Fcontent%2Fentry%2Ffofbmfe%2Fthe_revolution_of_1910_1910_1940%2F0%3FinstitutionId%3D7708.

[6] Claudio Fogu, "Digitalizing Historical Consciousness," *History and Theory* 48, no. 2 (2009): 108, accessed February 02, 2023, http://www.jstor.com/stable/25478839.

and principles of art. Still, digital instruments further assist the audience's understanding of the artwork by placing the viewer physically within the artwork to feel more connected with the representation. Dr. Jagodzinski states that "In the logic of representation, art education views perception as a subject perceiving an object, while perception in VR, as redefined by Deleuze…consists of understanding perception as affectivity."[7] Then, digital art history can clear the way for multifaceted studies and collaboration by taking advantage of digital tools and techniques. Like educator Sherry Mayo's article mentions how researchers of various disciplines could collaborate to evaluate and interpret art innovatively, steering towards a fuller discernment of art and its historical framework. Dr. Mayo writes about this in the following quotation:

> Technological media provides artists an opportunity to be media literacy experts, visualization modeling experts[,]…emergent technology developers, art educators, [and] artist-researchers [.] Artists, like researchers,…educators, and cultural objects are significant contributors to our evolution, and their contributions should be cultivated in art education models…[8]

Finally, the dialogical involvements and interactions with historical personages can offer a more profound and distinct understanding of the artwork and its makers. "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018," by researcher Steven Eiselen, describes how scholars will obtain perceptions into the creative method, the cultural perspective in which the art was created, and the intimate occurrences and inspirations of the artist. As stated by Eiselen, "The emergence of…'interactive entertainment'—dramatically changed storytelling from a mostly passive experience into an

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[7] Jan Jagodzinski, "Virtual Reality's Differential Perception: On the Significance of Deleuze (and Lacan) For the Future of Visual Art Education in a Machinic Age," *Visual Arts Research* 31, no. 1 (2005): 138, accessed February 02, 2023, http://www.jstor.org/stable/20715374.

[8] Sherry Mayo, "Implications for Art Education in the Third Millennium: Art Technology Integration," *Art Education* 60, no. 3 (2007): 48, accessed February 02, 2023, http://www.jstor.org/stable/27696216.

interactive one…players could personally interact with a simulated world…placing people directly into a story (in VR's case, via realistic computer simulations)."[9] Based off Eiselen's suggestion, placing a researcher in the narrative of artwork could immerse the user into Frida Kahlo's work, like *My Birth* (figure 3). There could be some areas that would be reconsidered in the review of Frida Kahlo's *My Birth* (figure 3), such as the barely noticeable miniature painting hanging above the central figure.[10] Similar to digital humanities precautions, using digital means with art history is not to be seen as a way to replace traditional methods, such as in-person or primary source research, but to add to current techniques to augment the comprehension of art history.

[9] Steven Eiselen, "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018," *Fire!!!* 5, no. 1 (2018): 49, accessed February 02, 2023, http://www.jstor.org/stable/10.5323/fire.5.1.0048.

[10] Frida Kahlo's *My Birth* (figure 3) reveals a picture hanging above the main figure giving birth that resembles the Virgin Mary being stabbed with swords, so those present would not need to suffer in the Virgin Mary's presence. Castro-Sethness believes the hanging picture to be the Virgin Mary from another painting of the *Mater Dolorosa* or *Nuestra Señora de los Dolores*, which translates to *Our Lady of the Pains* or *Suffering*, and a gospel verse which the religious painting is based on, "Yea, a sword shall pierce though thy own soul also, that the thoughts of many hearts may be revealed". See María A. Castro-Sethness, "Frida Kahlo's Spiritual World: The Influence of Mexican Retablo and Ex-voto Paintings on Her Art," *Women's Art Journal* 25, no. 2 (2004): 22, accessed October 26, 2021, https://web.p.ebscohost.com/ehost/detail/detail?vid=3&sid=10b9b4ef-9c6a-48ae-b5f8-37d621f6438c%40redis&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVob3N0LWxpdmU%3d#AN=505111865&db=aft.

The Impact of Generative AI on Research in Digital Humanities

Before examining the effects of generative artificial intelligence in digital humanities, a quick review of digital humanities and its current applications will be reconsidered as it applies to scholarly research. Digital humanities is a multifaceted field involving computational mediums, like data visualization, digital archives, and text analysis, applied to conventional humanities research. Primarily, digital humanities research utilizes technology to develop the perception and clarification of societal artifacts, writings, records, and other humanities disciplines. Using technological approaches, academics can analyze sizable datasets, reveal hidden designs, and obtain new understandings of several qualities of human culture. Digital humanities has several purposes, such as explaining and describing history visually and interactively. For example, Assistant Professor at the University of Wisconsin–Madison Kurt D. Squire's "Video Games and Education: Designing Learning Systems for an Interactive Age" shows how digital humanities can be taught with a deep understanding of historical and cultural factors contributing to social change. Dr. Squire argues that video games, such as *Civilization III*, have the prospective to transform education by providing students with an engaging learning experience that promotes critical thinking, problem-solving, and collaboration. As stated in Squire's article, "Games allow us to learn through doing and creating…Information is represented not just through text, but is multi-modal and transmedia…game play is deeply productive. Players solve problems and share their solutions, develop, test, and share strategies…"[11] In literature, digital humanities practices can dissect large bodies of a script, isolating patterns that may not be obvious through conventional

[11] Kurt D. Squire, "Video Games and Education: Designing Learning Systems for an Interactive Age," *Educational Technology* 48, no. 2 (2008): 18, accessed January 24, 2023, https://www.jstor.org/stable/44429558.

close reading approaches. This practice of separating patterns within a subject could also be used in Frida Kahlo's diary, which contains a multitude of her thoughts and sketches that might reveal more about the artist.[12] Digital humanities have beneficial teaching, societal heritage, and communal engagement implementations. In the article "Virtual Worlds: Inherently Immersive, Highly Social Learning Spaces," authors Laurence F. Johnson and Alan H. Levine explain a virtual reenactment called "Skoolaborate [for example] is a global project…to help students to collaborate on social action projects that benefit students who are less privileged than themselves."[13] Johnson and Levine's paper identifies shared engagement in virtual worlds that make them well-suited for learning, including interacting with other users and engaging in experiential learning activities. All in all, the digital humanities provides a formidable set of tools and techniques for investigating and clarifying the assorted aspects of human culture, and it has the probability to reshape the way we study and interpret this field.

One of the critical benefits of generative AI is its propensity to interpret and undertake vast quantities of data instantly and precisely, which can benefit operators in detecting foreign concepts that would be complicated to classify manually. A field in digital humanities where generative AI can be specifically practical is the examination and development of language learning. Users can gain a new understanding of linguistic and cultural events by preparing machine learning processes

[12] Though many researchers and historians have reviewed *The Diary of Frida Kahlo: An Intimate Self-Portrait*, one article discusses one section in depth that reveals connections between different myths and periods of time. Art historian Sharyn R. Udall pays particular attention to pages 140–142 of Kahlo's diary, which correlates to the Greek myth of Icarus and his fall after not paying attention to his father's warning. See Sharyn R. Udall, "Frida Kahlo's Mexican Body: History, Identity, and Artistic Aspiration," *Woman's Art Journal* 24, no. 2 (2003): 13, accessed October 26, 2021, https://doi.org/10.2307/1358781.

[13] Laurence F. Johnson and Alan H. Levine, "Virtual Worlds: Inherently Immersive, Highly Social Learning Spaces," *Theory Into Practice* 47, no. 2 (2008): 164, accessed February 02, 2023, https://www.jstor.org/stable/40071536.

to detect patterns from many audio samples. This can be seen in researchers and educators Rustam Shadiev et al.'s "Review of Studies on Recognition Technologies and Their Applications Used to Assist Learning and Instruction." Professors Shadiev et al.'s article reviews various recognition technologies and their potential applications in educational settings, such as a study in which dialogue identification improves articulation while providing correction methods for user errors. In one of the results, the article mentions, "Scholars developed an application with automatic speech recognition to improve language learners' speaking skills, where the application provides immediate feedback regarding how correct the language learners' pronunciation is…[and] obtain remedial exercises based on the type of mistakes they make."[14] Another example where generative AI could benefit language learners is in Linda C. Jones', an Associate Professor of Instructional Technology at the University of Arkansas, article "Listening Comprehension Technology: Building the Bridge from Analog to Digital," about the progression of technology in the field of listening abilities and its impact on language learning. Jones discusses how digital machinery allows for more modified education through adaptive learning programs that adjust to learners' needs. Jones states, "Students who interacted with pictorial and written annotations had more than one route to the information…The ability to select annotations also implies that students have a certain amount of choice and control over their learning."[15] All things considered, the potential for generative artificial intelligence to magnify and improve digital humanities study is immense, and it can be anticipated to see advanced applications of this technology to continuously grow.

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[14] Rustam Shadiev, Zi Heng Zhang, Ting-Ting Wu, and Yueh Min Huang, "Review of Studies on Recognition Technologies and Their Applications Used to Assist Learning and Instruction," *Educational Technology & Society* 23, no. 4 (2020): 63, accessed January 24, 2023, https://www.jstor.org/stable/10.2307/26981744.

[15] Linda C. Jones, "Listening Comprehension Technology: Building the Bridge from Analog to Digital," *CALICO Journal* 25, no. 3 (2008): 408, accessed January 24, 2023, https://www.jstor.org/stable/10.2307/calicojournal.25.3.400.

Generative artificial intelligence models can fashion modernized systems to assist digital humanities, using visuals, songs, or scripts, similar to existing examples of language learning procedures with knowledge gathered relevant to current society. As of 2022, researchers and educators Xieling Chen, Di Zhou, Haoran Xie, and Gary Cheng have conducted extensive reviews on using artificial intelligence within educational instruction, along with other co-authors and researchers Caixia Liu and Xinyi Huang. In the article "Two Decades of Artificial Intelligence in Education," Chen et al. discuss tendencies and areas related to AI uses in education involving a case examining natural language processing (NLP) for language education. Including known benefits of NLP for language education in giving quick feedback to correct users, the authors add other advantages, such as defining the meanings of terms according to their position within a phrase or sentence. According to Chen et al., "Word sense disambiguation facilitates effective vocabulary learning by resolving lexical ambiguity via automatically ordering dictionary definitions or assigning an appropriate meaning to a given context."[16] In Chen et al.'s later work with Xinyi Huang, they added to their previous research and highlighted how students also learned how to effectively listen, speak, read, and write in another language. In the article "Trends, Research Issues and Applications of Artificial Intelligence in Language Education," Chen et al. found a study resulting in language learners developing these language skills with better performance in vocabulary and grammar than students who did not use artificial intelligence. The authors write, "A context-aware vocabulary learning system…based on students' leisure time, i.e., new words would be suggested if the students had more time to learn. Results showed that the

[16] Xieling Chen, Di Zou, Haoran Xie, Gary Cheng, and Caixia Liu, "Two Decades of Artificial Intelligence in Education," *Educational Technology & Society* 25, no. 1 (2022): 40, accessed January 24, 2023, https://www.jstor.org/stable/10.2307/48647028.

students who used the system with context awareness outperformed those who did not."[17] Overall, generative artificial intelligence could modernize digital humanities studies by permitting researchers to form original data to better apprehend linguistics, among other fields.

[17] Xinyi Huang, Di Zou, Gary Cheng, Xieling Chen, and Haoran Xie, "Trends, Research Issues and Applications of Artificial Intelligence in Language Education," *Educational Technology & Society* 26, no. 1 (2023): 125, accessed January 24, 2023, https://www.jstor.org/stable/10.2307/48707971.

Discoveries with Generative AI and VR within Digital Art History

Digital art history is a somewhat contemporary field joining art history and digital technology. It comprises a wide assortment of subjects, from the history of digital art to the usage of digital tools in analyzing and understanding conventional art forms. As researchers and writers Jefferson Bailey and Lily Pregill confirm in their article, "Speak to the Eyes: The History and Practice of Information Visualization," digital art history began with documentation of the story of art from paper to digital means. Bailey and Pregill mention, "Technological advances in the 1990s shifted the field from paper into the digital realm, sparking the development of powerful information visualization methods."[18] Digital art includes an extensive range of systems, including computer-generated pictures, audiovisual artwork, interactive equipment, and net art. These compositions regularly defy traditional concepts of art and its association with the viewer and have opened up new ways of exploration for artists and scholars alike. One of the significant functions of digital art history is the examination and simplification of traditional art practices. Digital tools like 3D imaging, GIS (geographic information system) mapping, and data visualization have restructured how academics undertake historical art research. These digital tools allow for different methods of grasping the context in which artworks were crafted and the associations between other works and artists. Digital art history has also influenced how art is displayed and experienced by audiences in museums and galleries, allowing people to engross themselves with art in modern and immersive ways. This has cleared new opportunities for art instruction, outreach, and generating novel art and artistic expression forms. In addition to its uses in art history and museum

[18] Jefferson Bailey and Lily Pregill, "Speak to the Eyes: The History and Practice of Information Visualization," *Art Documentation: Journal of the Art Libraries Society of North America* 33, no. 2 (2014): 176, accessed March 03, 2023, https://www.jstor.org/stable/10.1086/678525.

operation, digital art has become an essential part of popular culture. For instance, in Alison Colman's article "Net.art and Net.pedagogy: Introducing Internet Art to the Digital Art Curriculum," digital devices have made it effortless for artists to design and circulate their work, and digital art has become an essential part of online communities and social media. Author Colman writes that "Internet artists…do not use the Internet as a medium…Rather, artists producing work on the Internet approach the Internet…as a transmission system for data that potentially simulates all reproductive media."[19] Digital art has also been included in advertising, gaming, and other businesses, further obscuring the lines between art and merchandising. As previously mentioned, digital art history embodies a rapidly growing field transforming how to think about and interact with compositions. Its applications are extensive, from scholarly research to popular culture, and it is guaranteed to continue to structure the art world for years to come.

Dialogical exchanges with artists or historical figures refer to a form of dialogue concerning participating in conversations with individuals from the past as if they were present. The demand for such interchanges comes from the need to further understand figures, like the elusive Mexican artist Frida Kahlo, and events embodying a significant role in shaping the current and future of civilization. For example, Frida Kahlo's reappearance as a feminist icon in the late twentieth century created a huge desire in the art history community to investigate this artist decades after she died in 1954. This reappearance could have come from various expositions or biographies about Frida Kahlo, as professors Pankl and Blake state in their article, "Made in Her Image: Frida Kahlo as Material Culture." Pankl and Blake mention a few of these events such as, "'Fridamania'[, which]…has been non-stop since Kahlo's rediscovery[,]…the 1982

[19] Alison Colman, "Net.art and Net.pedagogy: Introducing Internet Art to the Digital Art Curriculum," *Studies in Art Education* 46, no. 1 (2004): 62, accessed March 03, 2023, https://www.jstor.org/stable/3497096.

exhibition…at the Whitechapel Art Gallery in London,…the 1983 publication of Hayden Herrera's biography, *Frida*, and…others to the flowering of Chicana and feminist art movements in the 1970s."[20] Dialogical interventions can help better understand the views and inspirations of these figures and their effect on the world. Historian and author Dr. Annette Vowinckel's article, "Past Futures: From Re-enactment to the Simulation of History in Computer Games," provides a stimulating examination of the potential uses of computer games for historical education. Dr. Vowinckel concluded, "Cultural-historical reflection on simulation will enhance our understanding of scientific cultures in the Twentieth Century, and it will even more enhance our understanding of our notion of reality, especially historical reality under the impact of simulation."[21] Joining dialogical exchanges with past personages can offer a unique opportunity for self-awareness by gaining new insights into their beliefs, values, and biases and developing a more profound knowledge of how their perceptions are affected by the historical context in which they lived. Though, in Frida Kahlo's case, many art historians and scholars find various insights into her life without fixating on how it influenced her artwork as a whole, as in art professor Robert Silberman's exhibition review of Frida Kahlo's work in the Philadelphia Museum of Art of 2008. Silberman gives many examples of the artist's influence on society, including "the rise of feminism[,]…the preoccupation with the body in contemporary art (and life)[,]…the fascination with celebrity artist couples[, and]…identity politics and multiculturalism in Mexico and the United States."[22] In turn, dialogical interchanges can help promote critical thinking and intellectual

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[20] Pankl and Blake, "Made in Her Image: Frida Kahlo as Material Culture," 1.

[21] Annette Vowinckel, "Past Futures: From Re-enactment to the Simulation of History in Computer Games," *Historical Social Research / Historische Sozialforschung* 34, no. 2 (2009): 331, accessed February 02, 2023, https://www.jstor.org/stable/20762368.

[22] Robert Silberman, "Frida Kahlo. Minneapolis, Philadelphia and San Francisco," *The Burlington Magazine* 150, no. 1261 (2008): 285, accessed December 7, 2021, http://www.jstor.org/stable/20073068.

curiosity by exploring new ideas, challenging suppositions, and developing intricate views of the world. Dr. Pamela A. Gibson and Dr. Gregory B. Stolcis corroborate this viewpoint in their paper, "Reenacting, Retracing, and Rediscovering History: Making a Connection in the Public Administration Curriculum." Dr. Gibson and Stolcis state, "Reenactment or roleplaying of figures from history confronting present-day issues, retracing present-day administrative issues to past events, and rediscovering the significance of history in administrative studies…contribute to student appreciation of its applicability to their daily work life."[23] In addition, it could help promote empathy across cultural and historical boundaries by engaging with figures from different backgrounds and periods, understanding varied experiences and outlooks of others, and developing tremendous gratitude for the complexity of human history. All in all, dialogical interventions with historical individuals can encourage academic growth, reflection, and intercultural insight and enrich our comprehension of the past and present.

Generative AI has the potential to enable dialogical interventions and exchanges in various ways involving chatbots to lessen clashing points of view and transcend language barriers. Chatbots are conversational vehicles that use natural language processing (NLP) and machine learning algorithms to produce replies to users' questions or statements. As author Mike Levy addresses in his article, these chatbots, or chatterbots, can be taught to replicate human-like discussions, allowing for more natural and engaging communications. Levy's "Technologies in Use for Second Language Learning" goes on to explain how "chatbot interfaces utilize voice recognition and voice synthesis and an *avatar*—a virtual, animated human—as a conversational

[23] Pamela A. Gibson and Gregory B. Stolcis, "Reenacting, Retracing, and Rediscovering History: Making a Connection in the Public Administration Curriculum," *Journal of Public Affairs Education* 12, no. 1 (2006): 68, accessed February 02, 2023, https://www.jstor.com/stable/40215726.

participant."[24] As an example, chatbots could be used as virtual therapists, providing personalized counseling to individuals in need and helping explore thoughts in a non-judgmental environment by studying the person's responses and constructing customized questions and prompts. Generative artificial intelligence can also enable talks between individuals with different views or beliefs. By analyzing the language and tone of each person, the AI can identify probable areas of agreement and dispute and generate prompts encouraging additional conversation. This could be exceptionally useful in conflict resolution or political debates, where finding common ground and understanding each other's viewpoints is critical.

As previously mentioned in Frida Kahlo's work being viewed as many different styles and forms of inspiration, perhaps these AI talks could assist contradicting researchers in understanding one another.[25] Likewise, generative artificial intelligence can help master language obstacles and clear the way for cross-cultural relations. This is already used by digital applications like a massive multiplayer online game (MMOG) called *World of Warcraft* (WOW), as described in educators Dongping Zheng et al.'s article. In "Vocabulary Learning in Massively Multiplayer Online Games: Context and Action Before Words," Zheng et al. note MMOGs offer a unique context for vocabulary learning, with an immersive setting, allowing learners to use language in realistic and meaningful ways. In the case study by Zheng et al., "Conan[,]…a Japanese…undergraduate

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[24] Mike Levy, "Technologies in Use for Second Language Learning," *The Modern Language Journal* 93 (2009): 776, accessed January 24, 2023, https://www.jstor.org/stable/25612273?seq=1&cid=pdf-reference#references_tab_contents.

[25] This continuous revision of Frida Kahlo's work is shown in Marta Zarzycka's analysis of Kahlo's art, and the disappearance of body themes is overshadowed by Kahlo's biographies and feminine addition in the art world. Zarzycka states, "Indeed, Kahlo, turned into a modern version of a female martyr, clearly remains a victim of the biographical approach…the importance of her imagery has somewhat dissolved." See Marta Zarzycka, "'Now I Live on a Painful Planet': Frida Kahlo Revisited," *Third Text* 20, no. 1 (2006): 74, accessed November 1, 2021, https://web.s.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=4&sid=eb4d12cb-b525-4ea3-9c0f-d69aa6c618d0%40redis.

student in the United States [who]…studied English for 9 years[,]…pick[ed] up [the English] vocabulary utilizing the resources of WOW…[to] better understand meaning and form than would have been possible in a textbook or classroom."[26] This participant, Conan, was accompanied by an English-speaking graduate student guiding him during the game, which allowed Conan to learn terms while interacting with another person digitally and within an engaging system. By translating languages instantly and generating natural-sounding responses, generative AI can enable individuals who speak different languages to communicate more effectively and share their ideas. Altogether, generative artificial intelligence has the prospect of facilitating more engaging dialogical interventions and improving communication and comprehension between people.

[26] Dongping Zheng, Michael Bischoff, and Betsy Gilliland, "Vocabulary Learning in Massively Multiplayer Online Games: Context and Action Before Words," *Educational Technology Research and Development* 63, no. 5 (2015): 776 and 786, accessed January 24, 2023, https://www.jstor.org/stable/24546649.

Case Studies: Generative AI in Digital Humanities

In the sphere of digital humanities, several fascinating case studies showcase the transformative potential of generative artificial intelligence and virtual reality, revolutionizing how to explore, understand, and participate in diverse cultural and historical artifacts. One case study, by actor and scriptwriter Adolfo Adamo and researchers Pier Augusto Bertacchini et al., explains a virtual theater (VT) blending art and science to fashion a ground-breaking educational tool. In their paper, "Connecting Art and Science for Education: Learning through an Advanced Virtual Theater with 'Talking Heads,'" the authors "present the realization of a new kind of VT for education, in which talking heads interact with human actors, and difficult subjects are presented to the audience…"[27] This virtual theater uses modern technology to imitate a realistic theater event, complete with virtual heads that can intermingle with users and deliver information on various topics. Additionally, the authors argue that combining art and science can offer students and users a more alluring learning experience, allowing them to discover complex scientific ideas through visual and interactive methods. After conducting surveys of students who experienced the virtual theater, the authors found that "students have been enthusiastic about being part of the audience and about the possibility of further participation in the educational path of a future performance (character modeling, creative writing and so on)."[28] The authors maintain that merging art and science in the virtual theater offers a potent and inventive educational device that can help bridge the gap between conventional education and the rapidly evolving technological landscape of the

[27] Adolfo Adamo, Pier Augusto Bertacchini, Eleonora Bilotta, Pietro Pantano, and Assunta Tavernise, "Connecting Art and Science for Education: Learning through an Advanced Virtual Theater," *Leonardo* 43, no. 5 (2010): 444–445, accessed February 02, 2023, https://www.jstor.org/stable/40864229.

[28] Adamo, Bertacchini, Bilotta, Pantano, and Tavernise, "Connecting Art and Science for Education: Learning through an Advanced Virtual Theater," 447.

twenty-first century. Though this case study's potential to connect past figures and today's society is promising, the following review includes another area of digital humanities involving historical context and experiencing chronological events in simulators.

The subsequent case study returns to Annette Vowinckel's article, "Past Futures: From Re-enactment to the Simulation of History in Computer Games," which explores how computer games can be used as a tool for understanding and experiencing history. Vowinckel opens her review by explaining the concept of re-enactment, the recreation of historical occurrences in a physical or virtual setting, as limiting because they do not always center on showing the intricacy and subtle meanings of historical events. As described by Vowinckel, "While many games with premodern subjects are strategic games, those playing in the Twentieth Century are often mere war games…*Air Conflict*…enables the player to compete with pilots of the Allied Forces in WWII whose hit rates are historically documented and serve as references in the course of the game."[29] Vowinckel indicates that computer games propose a more versatile and interactive mode to historical re-enactment, allowing users to explore numerous perceptions and test different outcomes. However, Vowinckel expresses concerns about the validity of historical rendition in games and the possible underlining of negative stereotypes or generalizing of complex issues. Yet, they can be resolved through attentive game design, and the benefits are far more noteworthy. Similar to what Vowinckel states, "The video game *Waco Resurrections*…was designed and produced by…artists who were not interested in commercial promotion[;]…however, it does offer a kind of social or cultural criticism because it does not limit itself to a pop-cultural exploitation of war but forces the player to…communicate with nonviolent means."[30] Vowinckel's article

[29] Vowinckel, "Past Futures: From Re-enactment to the Simulation of History in Computer Games," 326.

[30] Vowinckel, 329.

provides a titillating analysis of the potential applications of computer games for historical education and advocates that games may offer a potent tool for appealing to new audiences in studying and reflecting on history. In this case study, the researcher also found virtual reality to benefit users in learning more about historical figures and events, which ties into the final study encompassing the simulation of a period to enhance the user's cultural awareness.

Similar to Adamo and Vowinckel's analyses, Steven Eiselen also promotes the potential of artificial intelligence and virtual reality to transform the study and teaching of historical society and eras. Eiselen's "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018" begins with the historical framework and explains the endeavor's goals to restructure the physical and cultural setting of 1920s and 1930s Harlem through virtual reality. This recreation of another time and immersion of oneself in the project is supported by Eiselen, as said in his article, "The implication that VR worlds can act as 'time machines' into history has been validated by projects such as Virtual Harlem…Current VR interfaces let participants explore worlds with their bodies and view them in 3D stereo vision…"[31] Eiselen provides a detailed account of the developing Virtual Harlem project, highlighting the advantages and disadvantages found and the possibility of transforming the study and teaching of the Harlem Renaissance, allowing scholars to experience this significant period in African American history in a new and immersive way. Throughout the article, Eiselen stresses the importance of integrating new technologies into the instruction of history, reasoning that virtual reality technology has the potential to change the way we apprehend and engage with the past. Still, Eiselen reassures the reader of continuing adjustments needed for "Virtual

[31] Eiselen, "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018," 49–50.

Harlem…include dialogue between the guest and avatars (characters) within the world, interactivity with the environment such as collecting objects into an inventory used to interact with other objects, improved visual effects…and artificial intelligence to drive vehicle and pedestrian behaviors in the outdoor scenes…"[32] Eiselen's article provides an absorbing case study of AI educating users on historical periods, providing historical events introduced by virtual reality, and highlighting the urgency of involving novel technologies in studying and teaching history. All these case studies feature the influence of generative artificial intelligence and virtual reality in revealing new scopes of understanding within the digital humanities and foreshadowing a favorable era of interdisciplinary relationship between technology and the humanities.

[32] Eiselen, 64.

Criticisms of Generative AI in Digital Art History Research

Generative artificial intelligence has been used in digital art history research to program the creation of art, examine existing art, and produce new perceptions of art history; however, there are several criticisms of generative AI in this field. Some critics of generative AI argue that it lacks imagination and produces results based on patterns and rules it has been shown. In this specific argument, critics dispute that this approach restricts the potential for innovative ideas in the art world. Another aspect of critiquing generative artificial intelligence is the bias in training data, where it is only as effective as the information it has been trained on, and the prompted result will also be partial if the training data is biased. This is a noteworthy concern in art history research, as highlighted in Huang et al.'s article, which states, "Discourse analysis conducted by AI may be biased if the data and algorithms used for training contain societal biases…include unbalanced and disproportionate information…which could lead to social inequities or social cohesion."[33] Next, for these reviewers, is how generative AI could create complex designs and how it has often become difficult to understand how AI arrived at these projects. As Shadiev et al. warned in the disadvantage section of their article, "Recognition technology accuracy is a common problem in studies on recognition technologies…in the future, improving the accuracy of recognition technology remains an important issue."[34] Similarly, the complex nature of generative artificial intelligence could hinder digital art history's reproducibility, which is necessary to verify that research discoveries can be validated. Overall, it is critical to recognize the arguable criticisms and confrontations accompanying the purpose of generative AI in the art history field.

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[33] Huang, Zou, Cheng, Chen, and Xie, "Trends, Research Issues and Applications of Artificial Intelligence in Language Education," 127.

[34] Shadiev, Zhang, Wu, and Huang, "Review of Studies on Recognition Technologies and Their Applications Used to Assist Learning and Instruction," 70.

Some critics and researchers argue that generative artificial intelligence could raise other concerns, such as copyright laws when sharing historical figures' past and artwork. Copyright laws regarding AI appear when discussing the reproduction of a historical person and their work, which could lead to devaluing the role of human artists and their creative process. As professor Dr. James Hutson and fellow educator Jeremiah Ratican's article states, "With the emergence of posthumous AI emulation, privacy concerns have become a significant ethical consideration[, which]…raises concerns about consent, data security, and the potential for unauthorized access or misuse of personal data."[35] Acknowledging and adhering to copyright laws is essential to respect the copyright laws and access to the sensitive property of artists and their work. This can also be reasonably practiced through academic integrity and the concept of "fair use" for graduate students researching artists and their artwork. Dr. Mayo mentions copyright laws in her paper on how "It is important to discuss responsible computer use early on in arts technology…helping them [users] to understand copyright and intellectual property…to understand what is *Fair Use* and what is theft of others' artwork."[36] In brief, the concerns researchers demonstrate about AI extends beyond copyright laws, including the historical portrayal of figures and the reproduction of their artwork, generating a complex discussion in AI-generated historical content.

Ethical concerns emerged while researching the intersection of copyright laws and ethical considerations in the context of artificial intelligence being used to show past artists and their work, including historical accuracy and age appropriateness. In regards to historical accuracy,

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[35] James Hutson and Jeremiah Ratican, "Life, Death, and AI: Exploring Digital Necromancy in Popular Culture—Ethical Considerations, Technological Limitations, and the Pet Cemetery Conundrum," *Metaverse* 4, no. 1 (2023): 4, accessed October 09, 2023, https://digitalcommons.lindenwood.edu/faculty-research-papers/478.

[36] Mayo, "Implications for Art Education in the Third Millennium: Art Technology Integration," 50.

misrepresenting a historical figure leads to the failure to represent this figure, their work, and the culture that connects to the artist, which has been seen in recent applications. According to Dr. Hutson, the inaccuracy associated with current artificial intelligence devices, such as reproductions of historical figures, has leaned towards more attention-grabbing occurrences, rather than factual events related to the character's life. As found in Dr. Hutson's work, "Interactive tools, like Character AI, prioritize engaging user experiences over historical veracity, presenting entirely fabricated interactions with historical personalities[.]…Although these AI-driven dialogues offer intriguing experiences, they may…provide…incorrect responses."[37] It is critical to consider AI tools, as they can potentially cripple the truthfulness of historical narratives and hamper the understanding of the factual setting surrounding artistic movements and cultural developments. Of course, the artist and their work should be as accurate as possible, yet this raises the issue of respecting the appropriateness of such factually historical material to different age groups within the audience. Though the target audience for this technology is students in higher education, as a tool for further research into historical figures, it could also be an extra learning method for audiences of all ages from elementary to high school. Dr. Mayo's article mentions such a program available in her local school district as an "Arts workshop…dedicated to fostering digital arts education across the lifespan[,]…serving youth from 7 to 17 years of age [and]…spanning from at-risk inner-city youth to a broader population of rabid technology consumers."[38] There are no apparent concerns that these digital reproductions have communicated inappropriate information as the students and teachers work together to create digital characters that follow the age-appropriate structure as the teacher guides the students in their work. Unfortunately, this will not

[37] Hutson, *Combining Large Language Models and Immersive Technologies to Represent Cultural Heritage in the Metaverse Context* (Publication forthcoming, 2023), 8.

[38] Mayo, 48.

be the case in all programs of generative AI as it becomes available to a broader audience, which is why certain precautions and careful vigilance in creating such digital tools should be taken. In summary, while generative artificial intelligence has the potential to revolutionize the field of digital art history research, it is not without its criticisms. Understanding the technology's boundaries and possible biases is fundamental to guarantee that it is used correctly and fairly in art history research.

Methodology

While researching this emerging digital application, there were few articles on the use of artificial intelligence (AI) and virtual reality (VR) in digital humanities to have conversations with past individuals, in which the Mexican artist Frida Kahlo was used as a prominent example throughout the paper. This steered the direction of the methodology towards a qualitative approach rooted in critical analysis and review of case studies that align with a few subcategories of the main topic. The main argument in articles about using AI in digital humanities was reproducing new material based on older data such as text, images, and audio recordings. Of the two articles best supporting the idea, Dr. Andrew Hurley's "Chasing the Frontiers of Digital Technology" discussed how visuals taken from St. Louis, Missouri, in the 1850s to 1950s, were reconstructed digitally for users to explore and discover information about this period. Alongside Hurley's contribution, a similar example of recreating a historical time to better understand the context was mentioned regarding Frida Kahlo's upbringing during the Mexican Revolution of 1910 to 1920. The information gathered for Kahlo's cultural lifestyle was from Lynn V. Foster's document "The Revolution of 1910 (1910 1940)" on Art Full Text, one of Lindenwood University's article databases. Then, Dr. Claudio Fogu's "Digitalizing Historical Consciousness" considered a digital presentation of recreating the understanding of the 9/11 attacks using documents and recordings created by witnesses. Both history professors, Hurley and Fogu, presented scenarios in which collecting several materials to form a new application with generative artificial intelligence benefited the users involved in their research.

Within digital humanities, the digital art history field is known to be expanding more with artificial intelligence and virtual reality systems, and the added tool of discussing art with a digitally refabricated artist may uncover another path for scholars to conduct further research.

Before examining these computerized characters, discussing digital art history as a vital subdivision of art history using artificial intelligence and virtual reality was essential. As the analysis above focused on revamping older information into new models, digital art history also simplifies the research process for users gathering many art history files. This is confirmed and proven in educator Jan Jagodzinski's examination of art elements and principles, combined with technology, exceeding the user's visual experience into a physical one within a work of art. Jagodzinski's "Virtual Reality's Differential Perception: On the Significance of Deleuze (and Lacan) for the Future of Visual Art Education in a Machinic Age" aligned with Dr. Sherry Mayo's findings with the inclusion of the historical context of the artwork being examined. Mayo's "Implications for Art Education in the Third Millennium: Art Technology Integration" explains how beneficial AI and VR could be to digital art history by adding the inputs of art historians, professors, and researchers into developing new art history theories as a community. Once the information on the artwork and its historical setting is gathered, the discussion of dialogical discussions with past figures can be formed with a parallel study made by researcher Steven Eiselen. Eiselen's "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018" describes how users could interact with the world simulated in the project from previous documents, making digitally enhanced conversations with historical personages more than possible. The example used to link Frida Kahlo in this section was to hypothetically have this technology virtually create one of her paintings, *My Birth* (figure 3), where a scholar could analyze unexplored areas, like the miniature painting of the Virgin Mary, as proposed by María A. Castro-Sethness. Jagodzinski, Mayo, and Eiselen successfully promoted the benefit of using artificial intelligence and virtual reality in the digital

art history field by laying the groundwork for developing high-tech processes for talking with past artists.

Another critical factor in using generative artificial intelligence in digital humanities is its impact on researchers and scholarly users of this technology. Besides the usual research conducted by reading documents or listening to recordings, scholars could assimilate the findings to have visually descriptive and interactive benefits. This incorporation of researchers within the digital world was examined in educator Kurt D. Squire's "Video Games and Education: Designing Learning Systems." Squire found in his study how video games that aim to enhance the educational understanding of a player could change the way digital humanities is taught. This same digital enhancement of knowledge could be helpful in Frida Kahlo's researched texts, such as her diary, reviewed by art historian Sharyn R. Udall, in which certain sections are examined thoroughly. Accompanying Squire's argument, Laurence F. Johnson and Alan H. Levine's "Virtual Worlds: Inherently Immersive, Highly Social Learning Spaces" adds global interaction as another benefit to generative AI and VR to digital humanities. In Johnson and Levine's article, they confirmed that players from any location could interact with one another to discover the findings available, promoting teamwork in an educational setting. Squire, Johnson, and Levine's proposals to expand the tools available for digital research using generative artificial intelligence and virtual reality are advantageous impacts on digital humanities.

An additional improvement in using generative AI and VR in digital humanities is the advancement of linguistic acquisition for second-language learners. Educators Rustam Shadiev et al. supported this portion of the literature review as they investigated equipment that aided second-language learners. In "Review of Studies on Recognition Technologies and Their Applications Used to Assist Learning and Instruction," Shadiev et al. find recognition technology useful to

improve languages spoken and correct any mistakes made by users. The outcome of improving language skills is also seen in Associate Professor Linda C. Jones's article "Listening Comprehension Technology: Building the Bridge from Analog to Digital." Jones's contribution to the topic here is her inclusion of the AI system's ability to adapt to the learner's needs as the user progresses in their education. Other advantages found by other researchers, Xieling Chen et al. in "Two Decades of Artificial Intelligence in Education," include AI defining words depending on their use within the context, which could differ across languages. As well, Xinyi Huang et al. found an increase in journalism, comprehension, communication, and listening skills in their later article "Trends, Research Issues and Applications of Artificial Intelligence in Language Education." Altogether, Shadiev et al.'s research reinforces digital humanities wherein generative artificial intelligence improves language learning skills.

Switching to the third section of the literature review on discoveries with generative AI and VR within digital art history, the discussion focuses more on the art history side of digital humanities. First, a quick summary of how digital art history was introduced in the art world is assisted by authors Jefferson Bailey and Lily Pregill in "Speak to the Eyes: The History and Practice of Information Visualization," which provides the decade of the 1990s to be the moment when visuals on paper went digital. This transition also impacted popular culture and accessibility to the general public, as seen in Alison Colman's article "Net.art and Net.pedagogy: Introducing Internet Art to the Digital Art Curriculum." Due to the public's desire for easier access to artwork, the appeal to understand past creators like Frida Kahlo is understandable, especially when her work's return in the later twentieth century created much attention towards the artist. In "Made in Her Image: Frida Kahlo as Material Culture," Professors Lis Pankl and Kevin Blake explain various points where Frida Kahlo could have reappeared, connecting to feminism and Chicana art

movements, exhibitions of her work, or biographies of Kahlo, as well. Using dialogical conversations in AI, Kahlo's artwork could have a more straightforward interpretation, as Dr. Annette Vowinckel's "Past Futures: From Re-enactment to the Simulation of History in Computer Games" mentions. In Dr. Vowinckel's paper, her argument for adding a virtual simulation to historical education supports the overall theme of including artificial intelligence in digital humanities and could open up new insights into the point of view of the historical character being interviewed. This may not create more ideas regarding Frida Kahlo's work as various researchers have formulated countless opinions about her work, as art professor Robert Silberman discusses in his article "Frida Kahlo. Minneapolis, Philadelphia and San Francisco." Silberman includes a handful of these views, such as the naked body in art, famous artist couples, individuality in politics, and cultural influence. However, the research conducted by Dr. Pamela A. Gibson and Dr. Gregory B. Stolcis in "Reenacting, Retracing, and Rediscovering History: Making a Connection in the Public Administration Curriculum" continues to support rediscovering historical and cultural events to promote global awareness as essential. Though it may not have many different insights into Frida Kahlo's work, digital interviews with a simulated version of this artist and other historical figures are helpful.

These conversations with generated historical figures could be created using specific programs like chatbots to assist the interviewer and the conversation's overall setting to avoid translation errors. These chatbots and their ability to appear human with their responses are what can create better technological chats with historical personages, as Mike Levy's article "Technologies in Use for Second Language Learning" describes. Still, those who study Frida Kahlo's work may provoke some historians to debate through this digital media, and the need for understanding each other's opinions is required in this aspect. This is why the inclusion of

educators Dongping Zheng et al.'s "Vocabulary Learning in Massively Multiplayer Online Games: Context and Action Before Words" was necessary. Zheng et al.'s article showed the result of an international dialogue between two individuals using these chatbots or avatars in a game, while one of the players spoke English and the other spoke Japanese. Even though both players spoke different languages, they could work together through digital communication and assist each other's avatars to accomplish goals in the game. The importance of using chatbots with embedded knowledge and data on how to address users is a step towards creating a generative AI application for talking with historical figures.

The next section of the literature review consisted of three case studies using artificial intelligence and virtual reality within digital humanities, such as theatre arts, historical reenactments, and cultural events. The first case study was found in Adolfo Adamo et al.'s article "Connecting Art and Science for Education: Learning through an Advanced Virtual Theater with 'Talking Heads." This group of researchers used virtual reality to recreate famous figures' heads to interact with the live actors on stage, as well as the audience, during a theatre act, and this encouraged the students involved to become more interested in the controversial topics being discussed. In the second case study, the review returns to Vowinckel's computer games usage as historical simulations to experience what these characters went through and understand the events better. Vowinckel's results showed users' intrigue while playing these games involving war and mass shootings, but with careful design methods, users will continue to educate themselves. The final case study also shows a previously mentioned researcher, Steven Eiselen, using artificial intelligence and virtual reality to create a period lost to modern society in "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018." In this simulation, users could immerse themselves in the past with opportunities to

learn while interacting with the game, but this project still needs adjustments in the exchange between avatars and the users. The main takeaway from these case studies is the benefit of using advanced technology to learn about digital humanities interactively.

So as not to be biased in the research of generative AI and VR for the use in educating scholars in digital humanities, a section highlighting the controversies with this technology was included. One of the conflicts with artificial intelligence and digital art history is the need for more creativity and restrictions made on new representations in the art world, as every new creation would be based on previous artwork. Another, more critical, dispute, stated in Xinyi Huang et al.'s paper, is the bias that could be applied while creating the technology, since an individual could shape the algorithm in a certain way to create unnecessary judgments, like stereotypes. Then comes AI's tendency to complicate results, making them unrecognizable from the original data set, as Shadiev et al. mentioned. In a section on its own, Dr. Hutson and Assistant Professor Ratican's article, provided by Dr. Hutson and the Lindenwood database, discussed an in-depth look at the concerns of copyright laws and privacy issues with artificial intelligence and virtual reality. Dr. Mayo's "Implications for Art Education in the Third Millennium: Art Technology Integration" also involved using previous data or art to create new work, a legal concern that must be monitored. Finally, it was essential to discuss the potential misuse of historical information as it pertains to finding the correct documents to recreate a digital character, as noted by Dr. Hutson in a text currently in the process of publication. Something to add to this section of historically accurate data to input in these digital applications is the topic of age-appropriate displays and information for a public with a wide age range. Not many researchers highlighted this issue, but it should be added as a precaution for future technology developments.

Results

The main findings of the first section of the literature review of this paper stresses the significance of digital art history and its position in developing the study of art and culture. As described in the review, generative artificial intelligence can recreate historical moments using existing data and documents. This technology is not restricted to textual data but encompasses visual and auditory information. The example that supports this photographic and audio documentation integration is provided in the literature review of the construction of computer models of downtown St. Louis from 1850 to 1950. Professor Hurley's article on these simulations allows website users to piece together historical advancements and gain insights into people, places, and events. This validates the potential for generative AI to generate immersive historical experiences for educational purposes as a tool to help students engage more effectively with the past, as Professor Hurley argues.

Another significant finding in the section titled Importance of Digital Tools in Broadening Humanities Studies is the function of digital art history in expanding the study of art. Digital art history facilitates the research and examination of large sets of data, in turn making studying copious artworks and reviews easier. Digital methods, such as virtual reality, offer a unique way of involving a user with art by placing the viewer within the artwork, promoting a deeper connection to the representation. This aligns with Professor Jan Jagodzinski's paper that perception is redefined, including emotional associations within virtual reality, offering a more immersive and experiential understanding of art. Moreover, Sherry Mayo's work emphasizes the potential of technology to bring together artists, educators, researchers, and technology developers in a collaborative effort to advance art education and understanding. Digital art history furthers

cooperation among researchers from various disciplines, enhancing the comprehension of art and its historical context.

The first section continues to explore the concept of dialogical involvement with historical figures through generative artificial intelligence. Researchers can gain awareness of the creative process, cultural perceptions, and artists' personal experiences by reproducing interactions with historical figures. This method allows for a more insightful understanding of artworks and their creators, as in Steven Eiselen's examination of simulating the Harlem Renaissance in virtual reality. Digital art history offers new tools like AI and VR to rediscover and unravel history and culture. Generative artificial intelligence opens up exciting opportunities for magnifying the apprehension of the past and the art world. Digital art history, in particular, stands out for its ability to make art more user-friendly, foster collaboration, and offer a more immersive understanding of artistic creations. Overall, the first section outlining the significance of digital methods in developing humanities research features the transformative potential of generative AI in digital humanities, especially in digital art history.

In the second section of the literature review, researchers like Kurt D. Squire, Linda C. Jones, and Xieling Chen et al. provide an overview of the digital humanities, highlighting its multifaceted nature and application in established humanities investigation. Squire's paper emphasizes how technology enhances the comprehension of various aspects of human culture through data visualization, documents, and text analysis. This interdisciplinary technique allows scholars to examine large datasets, reveal unknown patterns, and gain new insights into learning history and culture. Digital humanities can be implemented in education, as expressed by Squire's work on video games and their probability to transform learning experiences. Technology like

artificial intelligence has been researched to aid humanities education, and, in later sections, AI has been assessed as also assisting language learning in the digital humanities field.

In the second section of the literature review, Associate Professor Jones also discusses how generative artificial intelligence is fundamental in digital humanities, particularly regarding language learning. Jones draws attention to the capacity of AI to correctly process immense amounts of data, making artificial intelligence prominent in identifying challenging linguistic and cultural sequences from audio samples. Jones mentions studies that use generative AI to develop language learning, providing instantaneous feedback and personalized exercises to augment learners' pronunciation and comprehension. Another fundamental benefit of artificial intelligence is its versatility, as it can be employed to create modernized systems for numerous fields within digital humanities. For instance, AI can make visual representations, produce music, or draft scripts aligning with community needs and concerns. Altogether, generative artificial intelligence, as Jones adds to the research conducted, is essential in digital humanities, specifically as Jones highlights the subcategory of language learning.

Continuing with the secondary portion of the literature review, researchers and instructors Xieling Chen, Di Zhou, Haoran Xie, and Gary Cheng have examined how generative AI, especially in natural language processing (NLP), can enhance language education. NLP can present prompt feedback to language learners and demonstrate word interpretations, facilitating vocabulary learning. Chen et al. also comment that artificial intelligence contributes to a more modified and personalized learning experience. AI enables students to intermingle with digital resources and adapt their learning momentum and style according to the user's preferences, encouraging better vocabulary achievement and grammar skills. These outcomes emphasize the great potential of generative artificial intelligence in transforming digital humanities studies,

supporting researchers to produce new data to achieve deeper insights into linguistic and cultural experiences. Furthermore, Chen et al.'s study highlights the flexibility of AI to generate contemporary systems associated with current social needs. As technology advances, artificial intelligence is anticipated to perform a progressively essential role in improving the study of social culture and language, posing new scopes to scholarship and research. In this second portion of the literature review, generative AI shows how it adds to digital humanities research, and describes the critical functions of artificial intelligence in digital humanities, principally in the context of language learning and education.

In the third segment of the paper's review, the evolution and impact of digital technology on art history are discussed by researchers such as Jefferson Bailey, Lily Pregill, Dr. Pamela Gibson, Dr. Gregory Stolcis, Mike Levy, and Dongping Zheng et al. Digital art history, according to Bailey and Pregill's research, converted from paper-based cataloging to digital recordings in the 1990s, which is also recognized as a time of momentous technological advancements. This technological movement steered the development of compelling data visualization methods, revolutionizing how art history is analyzed and introduced. One of the structural purposes of digital art history is its ability to streamline conventional art practices through applications such as 3D imaging, GIS mapping, and data visualization. These tools have reformatted the methods used by academics to investigate the context in which artworks were fashioned and the relationships between various works and artists. This high-tech advancement influences academic research and reconstructs how art is exhibited and encountered by audiences in museums and galleries. It offers new opportunities for art education, outreach, and the creation of novel forms of artistic expression. Digital art's influence encompasses past the academic department, imbuing popular culture as found in Alison Colman's study, where artists can easily create and share their work through digital

devices, becoming fundamental to online communities and social media. Digital art has also established its position in marketing, gaming, and other industries, distorting the lines between art and business. This digital evolution is prepared to continue shaping the art world, requiring an acute understanding of both traditional and digital approaches in art historical studies.

As the third section of the literature review continues to discuss the effect of artificial intelligence and virtual reality on digital art history, researchers Dr. Annette Vowinckel, Dr. Pamela Gibson, and Dr. Gregory Stolcis discuss the notion of users participating in conversations with individuals from the past as if they were present. This method offers a unique opportunity, as Vowinckel mentions in her article, to understand historical figures' viewpoints, ideals, and biases and how their perspectives were shaped by the environment in which they lived. For instance, the reawakening of interest in Frida Kahlo, stated in Lis Pankl and Kevin Blake's paper, as a feminist icon in the late twentieth century illustrates the demand for dialogical interventions to better comprehend such figures' views and inspirations. As well as in Gibson and Stolcis's research, communicative exchanges with historical individuals can encourage critical thinking, academic curiosity, and empathy across cultural and historical barriers. From an educational point of view, these dialogical interactions with historical figures offer meaningful opportunities for scholastic growth, self-reflection, and intercultural perceptiveness.

Finally, the review's third section examines the prospect of generative AI to facilitate these conversational interventions in various frameworks as reviewed by Dongping Zheng, Michael Bischoff, and Betsy Gilliland's "Vocabulary Learning in Massively Multiplayer Online Games: Context and Action Before Words." Generative artificial intelligence, such as chatbots, can encourage conversations, decrease language impediments, and even act as a liaison in discussions between individuals with differing standpoints. Chatbots, supplied with natural language

processing and machine learning algorithms, can reproduce human-like conversations, constructing more captivating and authentic interactions. To illustrate this, chatbots could be employed as virtual therapists, offering personalized counseling and helping people dissect their contemplations in an impartial environment. AI can also facilitate discussions between individuals with contradictory opinions by pinpointing areas of agreement and disagreement, examining language and tone, and advancing further conversation. Generative AI, like chatbots, also has real-world applications in conflict resolution and political debates, where understanding opposing perspectives is fundamental. As seen in Zheng et al.'s work, this technology has already been developed in multiplayer online games, supporting language learning in immersive and engaging settings. The third section of the literature review emphasizes the transformative influence of digital technology on art history and the potential of artificial intelligence to facilitate dialogical interventions.

In the next section of the literature review, several case studies by Adolfo Adamo et al., Annette Vowinckel, and Steven Eiselen were examined, shedding light on the potential of generative AI and VR. The first case study, led by Adolfo Adamo, Pier Augusto Bertacchini, Eleonora Bilotta, Pietro Pantano, and Assunta Tavernise, introduces a cutting-edge educational tool called virtual theater (VT). Their paper, "Connecting Art and Science for Education: Learning through an Advanced Virtual Theater with 'Talking Heads,'" describes the formation of a particular VT that incorporates digital talking heads with human actors, offering complex questions to the audience. Adamo et al. advocate that this combination of art and science provides a fascinating learning experience, allowing students and others to discover complex scientific concepts through visual and interactive approaches. After conducting surveys of students who experienced virtual theater, Adamo et al. confirmed the students' enthusiasm for being part of the

activity and their interest in further involvement in the educational path of future performances, such as character sculpting and creative writing. This first case study demonstrates the possibility of integrating art and science in a virtual theater as a formidable and state-of-the-art scholastic device that bridges the gap between traditional education and the continuously developing high-tech outlook of the twenty-first century.

Another case study found in Anette Vowinckel's article, "Past Futures: From Reenactment to the Simulation of History in Computer Games," investigates using computer games as a source for understanding and experiencing history. Vowinckel considers the restrictions of live historical re-enactments, which often concentrate on specific facets of historical events and have a shortage of depth. Vowinckel contrasts this in her article with computer games, which offer a more adaptable and interactive method of historical re-enactment, permitting individuals to explore different perspectives and experiment with different outcomes. While Vowinckel recognizes concerns about the accuracy and potential spread of negative stereotypes in historical games, she stresses that careful game design can diminish these problems. Vowinckel also proposes the benefits of these historical games in offering a social and cultural analysis and providing a unique way to engage with history. This case study features the potential applications of computer games in historical education and their capacity to gain new audiences in studying and reviewing history.

The last case study discussed in the literature review is found in Steven Eiselen's "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014—2018," which examines the use of artificial intelligence and virtual reality to recreate the cultural and physical setting of the 1920s and 1930s Harlem. Eiselen asserts that VR can be a portal through time, presenting users with immersive experiences and a three-dimensional stereo vision. The comprehensive account of the Virtual Harlem project outlines

the purposes, advantages, and challenges, emphasizing the importance of incorporating new technologies into history education. Eiselen's paper provides an absorbing case study that demonstrates how AI and virtual reality can instruct individuals about historical periods, offering immersive encounters and highlighting the potential of technology in renovating the research and teaching of history. These three case studies collectively underline the effect of generative artificial intelligence and VR in increasing our conception of the digital humanities.

Though AI has made noteworthy contributions to digital art history research, allowing art formation, further analyzing existing artworks, and creating new perspectives on art history, the final section of the literature review focuses on generative AI's criticisms. One of the top critiques brings attention to the impression that artificial intelligence lacks true imagination, producing results or materials based on memorized patterns and rules. Some researchers found and argued that this approach may restrict the development of innovative ideas in the art world. Additionally, researchers like Xinyi Huang, Di Zou, and Gary Cheng share their concerns about bias in the inputted information, as AI's effectiveness depends on the quality and impartiality of the data generative artificial intelligence is trained on. Biased training material can result in discriminatory outcomes, potentially prolonging societal biases in art history study. Furthermore, generative AI's ability to create complicated designs, while remarkable, can often become unclear in the decision-making process, as mentioned in Rustam Shadiev, Zi Heng Zhang, Ting-Ting Wu, and Yueh Min Huang's paper. Together, prejudiced and obscure productions pose challenges to the reproducibility of digital art history research, critical aspects of ensuring the validation of research findings.

On the ethical front, artificial intelligence also raises other noteworthy limitations, including copyright laws and historical accuracy concerns. Using AI to recreate historical figures

and artworks could lead to ethical predicaments, particularly concerning copyright violations and the belittling of past artists and their creative processes. As previously stated in Dr. James Hutson and Jeremiah Ratican's article, privacy and consent issues become consequential when posthumous generative AI simulation is employed, potentially vulnerably exposing data security and misusing personal information. Following copyright laws and observing "fair use" becomes crucial, especially for graduate students in artist research, as seen in Dr. Mayo's "Implications for Art Education in the Third Millennium: Art Technology Integration." Finally, and one of the most important ethical concerns, is the issue of historical accuracy, as artificial intelligence may misrepresent historical figures and context, selecting engaging experiences over factual representations. As detailed in Dr. Hutson's "Combining Large Language Models and Immersive Technologies to Represent Cultural Heritage in the Metaverse Context," historical inaccuracy can impede the understanding of the historical framework of artistic movements and cultural developments. Historical accuracy is crucial in educational settings, where the appropriateness of AI-generated historical material for different age groups must be carefully monitored. However, few researchers have discussed this aspect of ethical concerns with AI. Recognizing these restrictions of artificial intelligence and virtual reality, tackling biases, observing copyright laws, and guaranteeing historical accuracy are fundamental for AI's responsible and fair utilization in art history research.

Discussion of the Results

As this paper's objective was to research the development of artificial intelligence and virtual reality to recreate a historical figure like Frida Kahlo, the results, as mentioned earlier, support this future application. The article by Professor Hurley is one of the examples discussing the use of generative AI to recreate historical events and incorporate the cultural contexts that align with the occurrences. If this tool recreated downtown St. Louis from 1850 to 1950, then this same device can recreate the early 1900s Mexico City, which is when and where Frida Kahlo grew up. In this instance, the possibility of recreating the time Frida Kahlo was raised could allow users to experience the events and cultural influences that shaped her perspective and artistic expression. This approach could provide valuable insights into many past artists' work by allowing viewers to immerse themselves in the historical and cultural context in which the artwork was created. This same concept of placing a user or researcher within a historical setting is also possible by inserting a participant within a work of art.

Jan Jagodzinski and Sherry Mayo discuss how art can be analyzed and discussed with other scholars using artificial intelligence and virtual reality by immersing the user within an artwork. Jagodzinski's paper proposes a method to involve a user in a phenomenological way to step inside the artwork created by an artist and experience a more engaging way to showcase these works of art. As the artist in focus for this paper is Frida Kahlo, an individual could immerse themselves visually, auditory, and other senses within one of Kahlo's paintings, like *My Birth* (figure 3), to create a more profound awareness within the viewer. Then, as Mayo stated in her article about dialogues between other scholars using AI and VR, this same viewer could connect with other Kahlo admirers or researchers and have conversations about the painting. Applying the tools offered with generative AI and virtual reality, the users could view a piece of art, gain further

knowledge about the illustration, and share their thoughts with others most efficiently. As the researcher gains additional knowledge, this could also lead to new theories associated with these artworks and artists provided by AI and VR.

As researchers and art history scholars continue to study the context in which artists and their works were created, artificial intelligence and virtual reality could advance these explorations through diversity, equity, and inclusion (DEI) types of interactions with past artists in a digital environment. The example of a digitized environment recreated with technology is based on Steven Eiselen's review of a virtually reconstructed Harlem during the early twentieth century, known as the Harlem Renaissance. Going back to the Frida Kahlo example, users would be able to interact with a diverse and forgotten environment placed in front of them as seen from Kahlo's perspective. As the user becomes more involved with the artist and their surroundings, the participant will likely obtain additional knowledge about how the artist experienced certain moments in the artist's life that may have influenced their work. For digital art history to implement AI and VR, students and researchers could be offered another path toward developing their understanding of past artists, their representations, and the motivations behind these artworks in a more participatory manner.

Outside of digital art history, generative AI could also be applied in other digital humanities fields to complement the courses offered, as Kurt D. Squire describes in his article, "Video Games and Education: Designing Learning Systems for an Interactive Age." Though Squire's paper focuses on gaming methods for supporting education, the user can access the information imported within the game to learn more about certain historical events and individuals throughout history. This connection of familiar gaming experience to obtain information for research or educational purposes could benefit the users who use the application for their studies. For instance, artificial

intelligence, used in Squire's paper, has summarized vast amounts of information, visual data, and articles to simplify the studies or investigation of students and scholars with an absorbing and interactive application. Using these summaries and main points generated by AI, the user can apply the information within their work, perhaps align it with multiple sources to support their topic, and continue to learn more about the past and previous civilizations. Artificial intelligence in humanities instruction, specifically in Squire's paper on understanding history and culture, is proven to aid learners and extend to other humanities fields, such as studying other languages.

Another article by Linda C. Jones discusses language learning combined with AI as another technique for language learners to develop their conversational and apprehension skills using multiple learning platforms in one resource. Generative AI is being used as a tool in this case as well to gather information, the auditory examples, and supply it to the user, the language learners, in a simplified way. This same tool can record the student practicing the language being learned, and the application could give instant recommendations on their acquired language skills, such as pronunciation. Jones comments explicitly on how the artificial intelligence tool can also adjust to the individual user to give modified results, and the learner can choose which correction the application offers. This means that generative AI can tailor its information to the individual's needs, speed, and learning process for the user to have a more developing learning experience. The advancement in the language learning field within humanities is expanded due to AI's differentiation method of giving users the choice of how to learn a language and at what pace is needed for the best results.

In the subsequent findings section of language learning, researchers Xieling Chen, Di Zhou, Haoran Xie, and Gary Cheng discuss another artificial intelligence method, natural language processing (NLP), to enhance and magnify the language learning process in grammar and context

settings. Similar to Jones' AI application, NLP can also render prompt advice to the users on their progress by studying the different meanings of words used differently across various cultures. Returning to Frida Kahlo and her cultural background as an example, students or users would be able to learn another language, in this case, Spanish, and use it to communicate with the artist. At the same time, the reproduced Kahlo replies with corrections or suggestions on the user's language skills. The interaction between the participant and the reproduced figure adds to existing artificial intelligence and virtual reality language learning applications. As the digitized historical figure of Frida Kahlo gives personalized feedback to the student, this NLP device creates a lively conversation between the person and AI. In this second section of the literature review, Squire, Jones, and Chen et al. presented reviews of generative AI and VR that supported digital humanities by broadening the skills gained in areas of education and language learning.

The last section of the literature review combines the effects of AI and VR, from the second section, on digital art history, discussed in the first section, within the digital humanities field as researched by authors Jefferson Bailey, Lily Pregill, Pamela Gibson, Gregory Stolcis, Mike Levy, and Dongping Zheng et al. The digital art history field evolved during the significant technological expansion of the 1990s, with captivating imagery processes altering how art history is taught and researched. As described by Bailey and Pregill, many of these developments have simplified the research process and showing of museum artworks with devices such as 3D imaging, GIS mapping, and visualized information. Looking closer at the exhibition of works of art using generative AI and VR, this online demonstration method can also join users from different cultures and backgrounds, creating more connections with like-minded individuals. This technology can connect these multicultural individuals on a virtual platform, such as digital galleries, designed to bring people of different backgrounds together and share their thoughts in a neutral setting. It is

essential to recognize that digital art history is a rapidly growing field with broad applications, ranging from scholarly research to its integration into popular culture.

The review's third section highlights how generative AI and VR affect digital art history, examined by Annette Vowinckel, Pamela Gibson, and Gregory Stolcis as students or individuals could eventually partake in exchanges with historical figures in the present. In Vowinckel's article, the author supported using digital methods to assist historical education with digital visual representations of past figures with new information that could be gained while using such devices. By engaging with figures from different backgrounds and periods, such as this paper's past figure example, Frida Kahlo, participants can gain a deeper appreciation for the complexity of human history. Both students and scholars must remember to approach such interactions with empathy and a gradual understanding of historical context. Gibson and Stolcis's research also mentions these attributes of sensitivity and nuance, as the authors believe artificial intelligence would increase both characteristics in the individuals joining the activity or study. These technological advancements provide new avenues for exploration, understanding, and engagement, both in the field of art history and in broader societal contexts. Using virtual reality and generative AI as instructive tools to have interactive discussions with historical figures in art history has been confirmed to bring about more appreciation for these past cultures and further develop the user's knowledge and introspection.

The final research section of the literature review closes with Dongping Zheng, Michael Bischoff, and Betsy Gilliland's article detailing an example of AI and VR technology called chatbots that attempt to connect individuals with other users on the digital platform. Zheng et al.'s investigation is in the form of multiplayer games offering assistance to individuals from diverse backgrounds and aiding in their communication skills with other players. The connection of

differing cultures collaborating on a digital program could be viewed as a stepping stone towards having artificial intelligent applications, like the chatbots used in Zheng et al.'s paper, becoming mediators to interpret what one individual would like to discuss with the other user. In the case of using Frida Kahlo's reproduced figure as the chatbot liaison, individuals would be able to talk with the historical figure and among themselves. During this, Kahlo would become an intermediary between various users to support discussions with opposing opinions and de-escalate any arguments between users, if any. Along with the future of generative AI and VR, these chatbots and other technologies have been instrumental in reshaping our approach to exploring, comprehending, and engaging with diverse cultural and historical artifacts.

After the research portion of the literature review comes the introduction of a few case studies led by Adolfo Adamo et al., Annette Vowinckel, and Steven Eiselen in their application of artificial intelligence and virtual reality as tools to educate individuals on history and influential figures from the past. In Adamo et al.'s project with virtual figureheads answering audience questions as a form of theatre instruction, the main takeaway from this experiment was the audience's involvement in asking complex questions instead of common inquiries to the AI-generated figures. The reason for this is the technology's ability to think at higher levels of understanding while keeping the public engaged. This ability is an attribute that would be beneficial in an AI and VR application for historical figures reproduced digitally and programmed to discuss complicated topics with individuals. The second and third case studies by Vowinckel and Eiselen respectfully focus on virtual reproductions of historical environments in which users can interact with historical societies and landmarks. These virtual reproductions can immerse the individual within a different environment and period that would complement the user's research or study. Combining Adamo et al.'s case study on AI-reproduced historical figures with Vowinckel

and Eiselen's reviews on historical VR settings would produce the optimal digital application for conversing with historical figures. These case studies foreshadow a promising era of interdisciplinary collaboration between technology and the humanities, offering innovative ways to engage with culture, history, and education.

In the next couple of discussions on the literature review results, the main topic will be the criticisms connected to the use of artificial intelligence and virtual reality as educational tools in digital art history and other humanities fields. One of the significant criticisms of AI is the propensity for biased information to be implemented in the programming of the applications, which could lead to inaccurate data or negatively viewed information that turns facts into opinions. Though AI has been discussed as having a chance to produce unoriginal products or lacking creativity, researchers Xinyi Huang, Di Zou, and Gary Cheng were more concerned with the destructive impact of prejudiced information that could be introduced in AI devices. If Frida Kahlo's reproduced image discussed artwork with one point of view, like feminism, instead of various other inspirations linked to the past artist, then users would not feel the need to research other viewpoints of Kahlo's work to find different meanings behind the artwork. Generative AI has also been linked to creating results that were difficult to understand, as mentioned in Rustam Shadiev, Zi Heng Zhang, Ting-Ting Wu, and Yueh Min Huang's article. Again, this involves the data entered at the beginning of production with the AI device in which developers must not overcomplicate the files inputted, such as designs for artwork to be reproduced. Artificial intelligence designers must avoid constructing vague and influenced products to present compelling and comprehensible mechanisms for individuals to use easily.

The last criticism section will focus on the ethical side of generative AI reproducing artworks and past artists as it could involve problems with copyright laws and historical accuracy,

as discussed in Dr. James Hutson, Jeremiah Ratican, and Dr. Sherry Mayo's articles. When discussing copyright laws and reproduction of past artists' works, the problem that could be encountered is the evasion of the "fair use" policy, as Dr. Mayo said in her research, where individuals, or AI, produce materials that are copies of other products. Artificial intelligence could give an example close to the work of art being researched, but the user must follow copyright laws prohibiting the individual from advertising the reproduced work as an original piece. Additionally, Dr. Hutson and Ratican's paper involving confidentiality and the individual's permission to use artwork or an artist's personal life creates issues regarding protecting sensitive information and mishandling personal details. Then, the last criticism found in the literature review's research dealt with the validity of historical reproductions, such as past artists or their cultural backgrounds. How historical inaccuracy may occur is when developing these historical figures and their settings, the developers try to recreate more elaborate figures or backgrounds rather than using the original descriptions. As Hutson explains in a separate article, "Combining Large Language Models and Immersive Technologies to Represent Cultural Heritage in the Metaverse Context," this misuse of facts would prevent users from learning about the artist and their work to support their research and studies. Overall, every issue of confronting biased information, following copyright laws, and confirming historical accuracy could be faced with generative AI and VR and must be acknowledged as potential threats to the advancement of research in digital humanities.

Conclusions

The results presented earlier in this paper have meaningful theoretical implications for digital humanities, art history, and generative artificial intelligence. The literature review began by featuring the transformative prospect of AI in digital humanities, especially in the context of digital art history. While implementing caution and ethical scrutiny in technology use is essential, artificial intelligence proposes stimulating possibilities for expanding the perception of the past and the art world. Mainly, digital art history stands out for its potential to make art more accessible, encourage collaboration, and deliver a more immersive understanding of artistic creations. The second segment of the review highlights the adaptability of generative AI and its function in language learning and education within digital humanities. This part of the review highlights AI's capacity to process vast amounts of data, identify linguistic and cultural patterns, and offer personalized learning experiences. As technology advances, artificial intelligence is anticipated to play an increasingly vital role in developing the study of culture and language, contributing new scopes to scholarship and research. The third section of the literature review examines the growth and influence of digital technology on art history, and it highlights the digital tools modifying academic research, exhibiting art, and assimilating art into popular culture. The idea of dialogical exchanges with historical figures brings rare opportunities for intellectual growth and intercultural awareness, while generative AI facilitates these talks to occur in various contexts.

During the research conducted for the paper, a few case studies and conflicts with AI were found and analyzed to give supportive studies and limitations with this growing technology. The case studies discussed in the review demonstrate how artificial intelligence and virtual reality restructure the study of culture, history, and education. AI and VR present novel ways to engage with different cultural and historical artifacts, bridging the gap between conventional education

and the constantly changing technological landscape. However, it is critical to recognize the criticisms connected with generative AI, including a lack of genuine creativity, bias in training data, obscurity in the decision-making process, copyright issues, and the possible compromise of historical accuracy. These criticisms require careful consideration and ethical use of AI in research, particularly for students involved in artistic investigation. The literature review provides a comprehensive summary of the theoretical implications of artificial intelligence and virtual reality in digital humanities, art history, and education while emphasizing these technologies' challenges and ethical considerations.

There was one major limitation in the research on generative AI while investigating criticisms, which is that the articles should have discussed educating a diverse group of people of various ages and the sensitivity involved with describing the history of artists and their work. Even though AI technologies can improve accessibility to art historical comprehension, the likely biases and age-related assumptions inserted in the systems risk excluding specific demographics. Take Frida Kahlo's *My Birth* (figure 3) as a painting where the female genitalia is exposed to the viewer, and the audience includes a family with a young child who was not previously told about the birthing process, or the parents are not comfortable explaining what is being shown to their child. Though this painting in particular could be easily avoided by the family, the artist had many moments, like many other historical figures, in her life that were uncomfortable, painful, and negative, which may not be suitable for all ages. It is also important to note how recent this topic is while conducting this research, which may add to this age sensitivity limitation. Future research should include the awareness of age appropriateness when generative AI and VR reproduce factual art history to the general public.

To ensure that issues such as age-inappropriateness can be avoided, there are recent artificial intelligence software like ChatGPT and virtual reality applications that users can access and adjust for these programs to recreate accurate historical figures and events. The first part of using any generative AI program is to confirm the sources gathered are from primary sources, and in Frida Kahlo's case, these sources include original newspaper interviews, journals, and other documents digitized to input in the digital application. Following the ChatGPT application, a user must create an account with the advanced configurations option, including the primary sources mentioned previously, so Frida Kahlo's responses are as close to the original figure as possible. Afterward, ChatGPT includes a feature that customizes the replies that the digitized figure will offer according to the audience. From this personalized feature, the individual recreating the historical figure can change the delivery of the historical figure's responses, specifically in tone and word choice. Using Frida Kahlo's persona in this way, the digital Frida Kahlo could share their lives and experiences with an audience too young to understand more mature events such as pregnancy loss or marital issues. Finally, this artificial intelligence application would be used as the base for virtual reality software to bring Frida Kahlo and other historical figures into an immersive environment for other users. Delving into the intricacies of recreating historical figures with generative AI and VR, the overarching goal is to enhance the understanding of history, offering a novel perspective that transcends traditional modes of scholarship and invites participants to engage with the past in unprecedented ways.

Evaluating artificial intelligence and its applications in digital humanities, especially in art history, has revealed many promising opportunities for research and education. The results have clarified the transformative potential of AI, underlining its ability to recreate historical moments and cultural environments and participate with historical figures. The combination of technology

with art history has reformatted traditional practices, offering new methods of analysis and interaction. However, staying mindful of the criticisms and ethical concerns accompanying generative AI in art history research is fundamental. Critics argue that AI lacks true imagination, potentially stifling innovative ideas, could incite bias in training data, and AI's unclear decision-making processes are valid points of contention. Ethical issues, such as copyright infringement, privacy, and historical accuracy, must also be addressed sensibly. For graduate students in digital art history, navigating the stimulating possibilities offered by artificial intelligence while being cautious about these concerns is imperative. Responsible and ethical utilization of generative AI in research and a deep understanding of its limits will ensure contributions to the art history field are both innovative and ethically sound. Integrating technology into art history holds great promise and can structure the discipline's future.

Illustrations

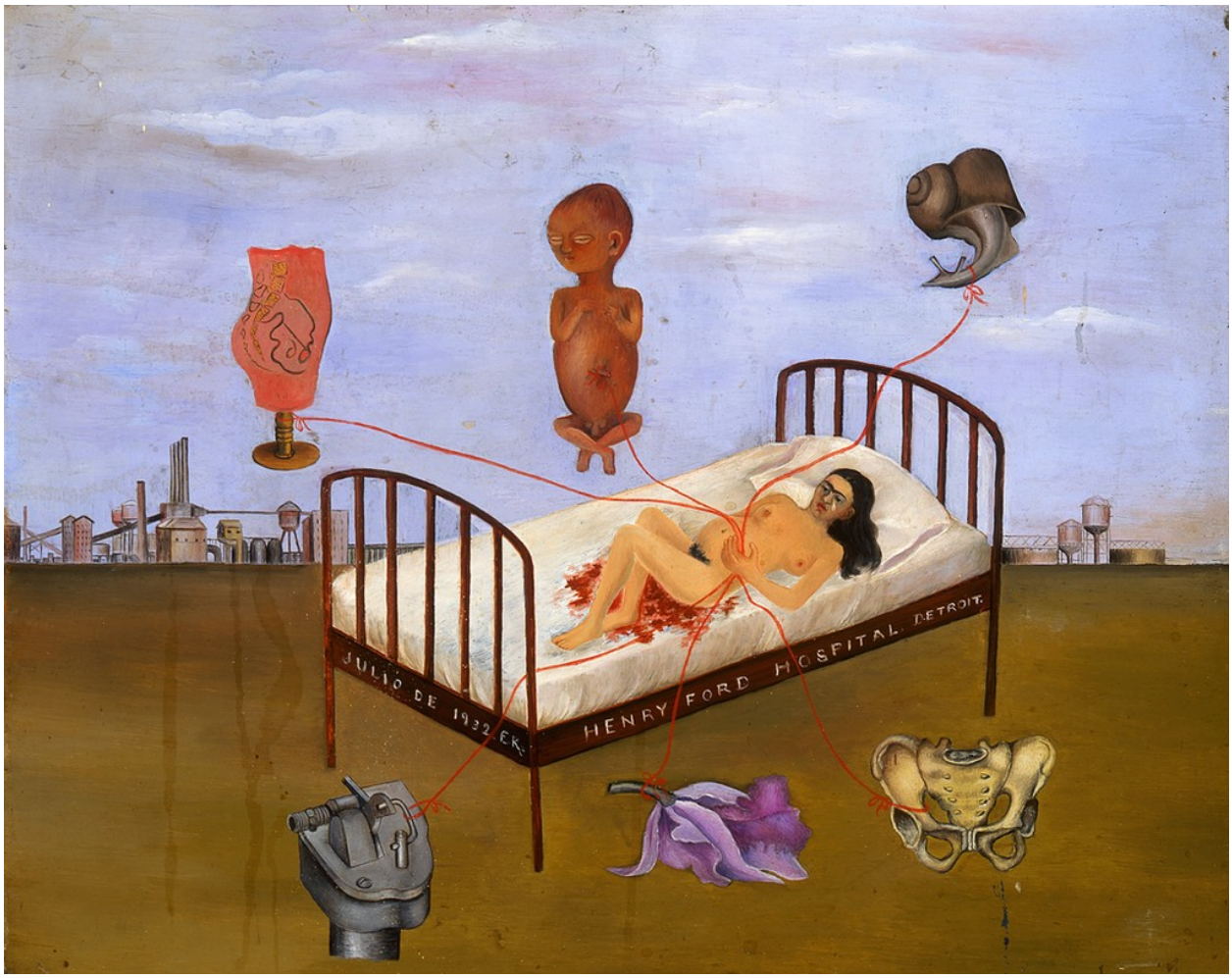

Figure 1. Frida Kahlo, *Henry Ford Hospital,* 1932. Oil on metal, 30.5 x 38.5 cm, Museo Dolores Olmedo Patiño, Ciudad de México, Distrito Federal, México.

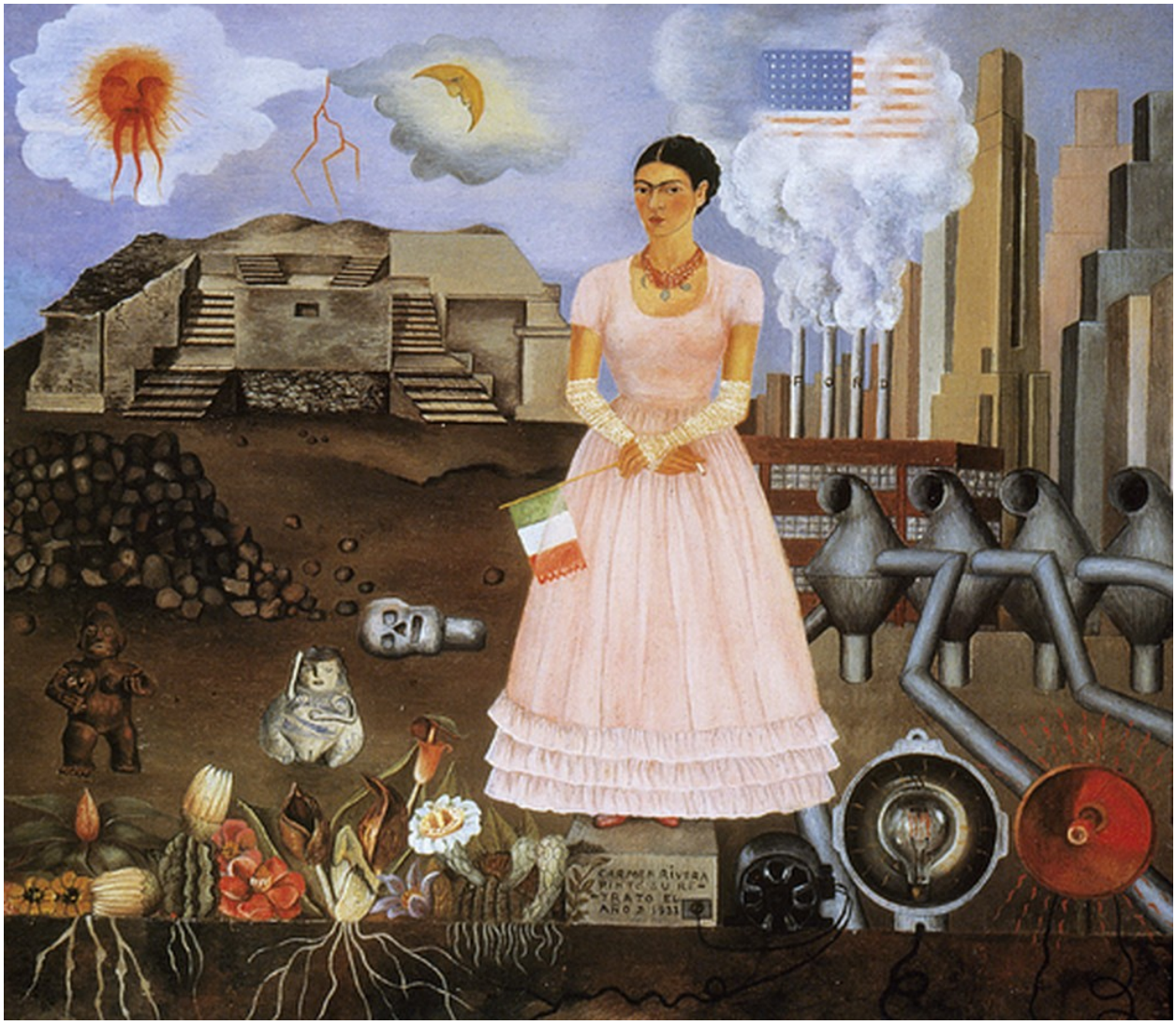

Figure 2. Frida Kahlo, *Self-Portrait Along the Borderline of Mexico and the United States*, 1932. Oil on metal. 11 ¾ x 13 ½ in, Modern Latin American Art (Jacqueline Barnitz, Art and Art History Department, University of Texas, Austin).

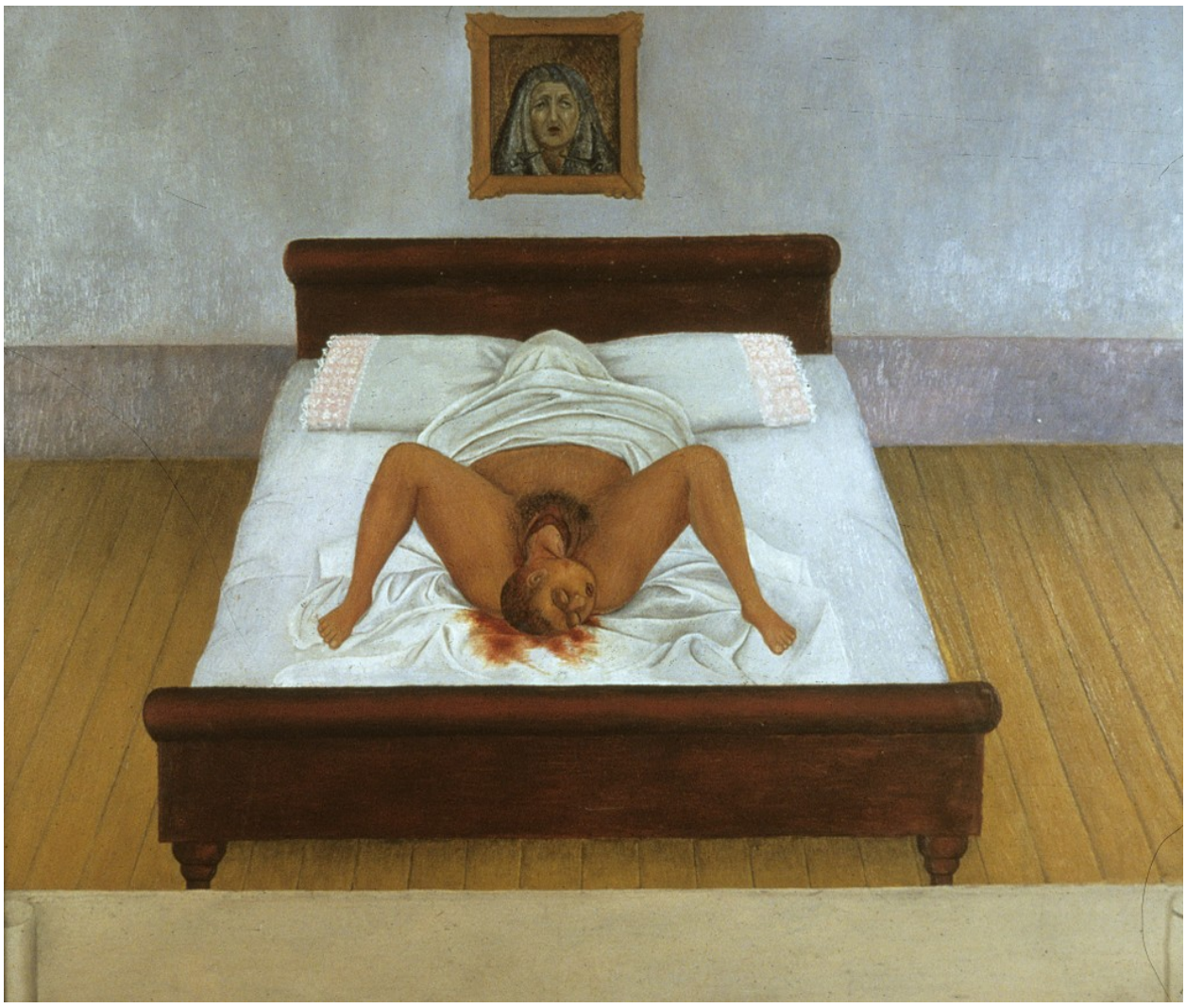

Figure 3. Frida Kahlo, *My Birth*, 1932. Oil on sheet metal. 12 ½ x 14, Modern Latin American Art (Jacqueline Barnitz, Art and Art History Department, University of Texas, Austin).

Bibliography

Adamo, Adolfo, Pier Augusto Bertacchini, Eleonora Bilotta, Pietro Pantano, and Assunta Tavernise. "Connecting Art and Science for Education: Learning through an Advanced Virtual Theater." *Leonardo* 43, no. 5 (2010): 442–448, 424. Accessed February 02, 2023. https://www.jstor.org/stable/40864229.

Bailey, Jefferson and Lily Pregill. "Speak to the Eyes: The History and Practice of Information Visualization." *Art Documentation: Journal of the Art Libraries Society of North America* 33, no. 2 (2014): 168–191. Accessed March 03, 2023. https://www.jstor.org/stable/10.1086/678525.

Castro-Sethness, María A. "Frida Kahlo's Spiritual World: The Influence of Mexican Retablo and Ex-Voto Paintings on Her Art." *Woman's Art Journal* 25, no. 2 (2004): 21–24. Accessed October 26, 2021. https://web.p.ebscohost.com/ehost/detail/detail?vid=3&sid=10b9b4ef-9c6a-48ae-b5f8-37d621f6438c%40redis&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVob3N0LWxpdmU%3d#AN=505111865&db=aft.

Chen, Xieling, Di Zou, Haoran Xie, Gary Cheng, and Caixia Liu. "Two Decades of Artificial Intelligence in Education." *Educational Technology & Society* 25, no. 1 (2022): 28–47. Accessed January 24, 2023. https://www.jstor.org/stable/10.2307/48647028.

Colman, Alison. "Net.art and Net.pedagogy: Introducing Internet Art to the Digital Art Curriculum." *Studies in Art Education* 46, no. 1 (2004): 61–73. Accessed March 03, 2023. https://www.jstor.org/stable/3497096.

Eiselen, Steven. "Simulating the Harlem Renaissance in Virtual Reality: Glancing into the Development of the Virtual Harlem Project from 2014–2018." *Fire!!!* 5, no. 1 (2018): 48–65. Accessed February 02, 2023. https://www.jstor.org/stable/10.5323/fire.5.1.0048.

Fogu, Claudio. "Digitalizing Historical Consciousness." *History and Theory* 48, no. 2 (2009): 103–121. Accessed February 02, 2023. https://www.jstor.com/stable/25478839.

Foster, Lynn V. "The Revolution of 1910 (1910 1940)." *In A Brief History of Mexico*, October 26, 2021. https://go.openathens.net/redirector/lindenwood.edu?url=https%3A%2F%2Fsearch.credoreference.com%2Fcontent%2Fentry%2Ffofbmfe%2Fthe_revolution_of_1910_1910_1940%2F0%3FinstitutionId%3D7708.

Gibson, Pamela A. and Gregory B. Stolcis. "Reenacting, Retracing, and Rediscovering History: Making a Connection in the Public Administration Curriculum." *Journal of Public Affairs Education* 12, no. 1 (2006): 63–80. Accessed February 02, 2023. https://www.jstor.com/stable/40215726.

Huang, Xinyi, Di Zou, Gary Cheng, Xieling Chen, and Haoran Xie. "Trends, Research Issues and Applications of Artificial Intelligence in Language Education." *Educational*

Technology & Society 26, no. 1 (2023): 112–131. Accessed January 24, 2023. https://www.jstor.org/stable/10.2307/48707971.

Hurley, Andrew. "Chasing the Frontiers of Digital Technology." *The Public Historian* 38, no. 1 (2016): 69–88. Accessed February 02, 2023. https://www.jstor.org/stable/10.2307/26420756?seq=1&cid=pdf-reference#references_tab_contents.

Hutson, James. *Combining Large Language Models and Immersive Technologies to Represent Cultural Heritage in the Metaverse Context*. Publication Forthcoming: 2023.

Hutson, James and Jeremiah Ratican. "Life, Death, and AI: Exploring Digital Necromancy in Popular Culture—Ethical Considerations, Technological Limitations, and the Pet Cemetery Conundrum." *Metaverse* 4, no. 1 (2023): 1–12. Accessed October 09, 2023. https://digitalcommons.lindenwood.edu/faculty-research-papers/478.

Jagodzinski, Jan. "Virtual Reality's Differential Perception: On the Significance of Deleuze (and Lacan) For the Future of Visual Art Education in a Machinic Age." *Visual Arts Research* 31, no. 1 (2005): 129–144. Accessed February 02, 2023. https://www.jstor.org/stable/20715374.

Johnson, Laurence F. and Alan H. Levine. "Virtual Worlds: Inherently Immersive, Highly Social Learning Spaces." *Theory Into Practice* 47, no. 2 (2008): 161–170. Accessed February 02, 2023. https://www.jstor.org/stable/40071536.

Jones, Linda C. "Listening Comprehension Technology: Building the Bridge from Analog to Digital." *CALICO Journal* 25, no. 3 (2008): 400–419. Accessed January 24, 2023. https://www.jstor.org/stable/10.2307/calicojournal.25.3.400.

Landau, Ellen G. "Reviewed Work(s): Diego Rivera and Frida Kahlo in Detroit by Mark Rosenthal: Frida Kahlo's Garden by Adriana Zavala, Mia D'Avanza and Joanna L. Groarke" *Woman's Art Journal* 37, no. 1 (2016): 56–58. Accessed November 1, 2021. https://www.jstor.org/stable/26452058.

Levy, Mike. "Technologies in Use for Second Language Learning." *The Modern Language Journal* 93 (2009): 769–782. Accessed January 24, 2023. https://www.jstor.org/stable/25612273?seq=1&cid=pdf-reference#references_tab_contents.

Mayo, Sherry. "Implications for Art Education in the Third Millennium: Art Technology Integration." *Art Education* 60, no. 3 (2007): 45–51. Accessed February 02, 2023. https://www.jstor.org/stable/27696216?seq=1&cid=pdf-reference#references_tab_contents.

Pankl, Lis, and Kevin Blake. "Made in Her Image: Frida Kahlo as Material Culture." *Material Culture* 44, no. 2 (2012): 1–20. Accessed November 1, 2021. https://search.ebscohost.com/login.aspx?direct=true&AuthType=sso&db=aft&AN=82608971&site=ehost-live.

Shadiev, Rustam, Zi Heng Zhang, Ting-Ting Wu, and Yueh Min Huang. "Review of Studies on Recognition Technologies and Their Applications Used to Assist Learning and Instruction." *Educational Technology & Society* 23, no. 4 (2020): 59–74. Accessed January 24, 2023. https://www.jstor.org/stable/10.2307/26981744.

Silberman, Robert. "Frida Kahlo. Minneapolis, Philadelphia and San Francisco." *The Burlington Magazine* 150, no. 1261 (2008): 285–86. Accessed December 7, 2021. http://www.jstor.org/stable/20073068.

Squire, Kurt D. "Video Games and Education: Designing Learning Systems for an Interactive Age." *Educational Technology* 48, no. 2 (2008): 17–26. Accessed January 24, 2023. https://www.jstor.org/stable/44429558.

Udall, Sharyn R. "Frida Kahlo's Mexican Body: History, Identity, and Artistic Aspiration." *Woman's Art Journal* 24, no. 2 (2003): 10–14. Accessed October 26, 2021. https://www.jstor.org/stable/1358781.

Vowinckel, Annette. "Past Futures: From Re-enactment to the Simulation of History in Computer Games." *Historical Social Research / Historische Sozialforschung* 34, no. 2 (2009): 322–332. Accessed February 02, 2023. https://www.jstor.org/stable/20762368.

Zarzycka, Marta. "'Now I Live on a Painful Planet': Frida Kahlo Revisited" *Third Text* 20, no. 1 (2006): 73–84. Accessed November 1, 2021. https://web.s.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=4&sid=eb4d12cb-b525-4ea3-9c0f-d69aa6c618d0%40redis**.**

Zheng, Dongping, Michael Bischoff, and Betsy Gilliland. "Vocabulary Learning in Massively Multiplayer Online Games: Context and Action Before Words." *Educational Technology Research and Development* 63, no. 5 (2015): 771–790. Accessed January 24, 2023. https://www.jstor.org/stable/24546649.