UAI JOURNAL OF ARTS, HUMANITIES AND SOCIAL SCIENCES (UAIJAHSS)

Aesthetic-driven Virtual Simulation Scene Design: Strategies to Improve Visual Experience and Learning Interest

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ABSTRACT

Virtual simulation-based online courses have been widely adopted across industries, particularly in high-risk, highly destructive, and practice-intensive fields such as engineering, medicine, and military applications. These courses provide immersive experiences that simulate real-world scenarios. However, previous virtual simulation course design primarily focused on authenticity and practicality, often neglecting aesthetic considerations. This resulted in monotonous, uninspiring environments that lacked visual appeal. The conflict between virtual art creation and traditional aesthetic experiences further diminished students' genuine aesthetic engagement, weakened their critical thinking skills, and hindered knowledge retention. This paper explores the application of aesthetics in digital media art virtual simulation course design through examining the evolution from aesthetic experience to aesthetic cognition. By enhancing visual appeal in course environments, it aims to boost student interest, cultivate aesthetic appreciation, and strengthen critical reflection abilities.

Keywords: *aesthetics, digital media art, virtual simulation, artificial intelligence, curriculum reform*

1. Introduction

Aesthetic experience is a profound human engagement with beauty, involving its perception, evaluation, and contemplation. More than sensory pleasure, it is a soul-stirring journey of reflection. Through aesthetic engagement, people discover beauty's joy and delve into the intrinsic meaning and truth of things, making it an essential part of life. The richness and depth of aesthetic experience ultimately stem from practical human activities. In art, it manifests as aesthetic experience, which decisively shapes one's ability to appreciate and embrace artistic works.

With the rapid advancement of computer technology, the digital media era has arrived, bringing revolutionary changes to the means of visual art expression. Traditional text and graphics can no longer satisfy people's demand for visual imagery. Modern information technology has greatly expanded people's horizons, unleashed unprecedented imagination, and provided infinite possibilities for creative realization.

In the realm of visual arts, virtual reality technology leverages artificial intelligence to create highly realistic virtual worlds. These

environments can simulate real-world scenarios or recreate fictional settings transcending physical time and space. Within this virtual space, people can interact with digital objects through computer and information technologies in natural, familiar ways, experiencing a sense of immersion that feels almost real.

Against this technological backdrop, educators have pioneered a groundbreaking virtual simulation teaching model by integrating simulation technology with curricula. This approach not only enriches course content delivery through dynamic visualizations but also redefines pedagogical innovation. By transcending physical boundaries, virtual simulations create immersive learning environments that enhance both efficiency and engagement. Such transformative practices are poised to reshape educational paradigms for generations to come.

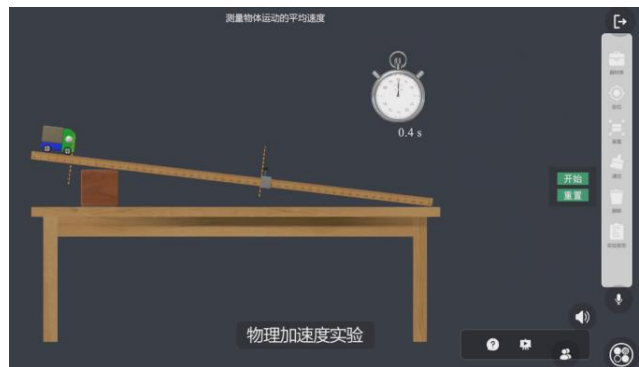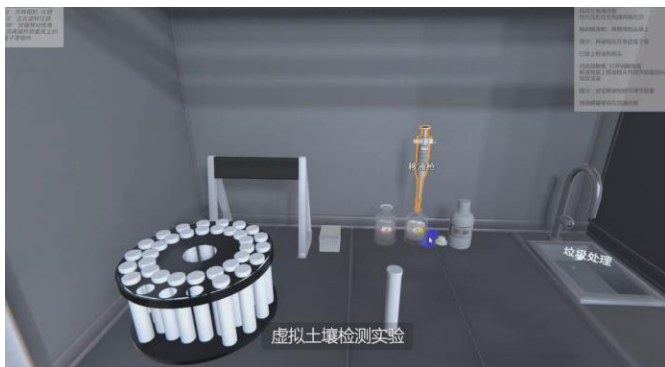## 2. Advantages of Virtual Simulation Teaching Course

Virtual simulation-based online courses have become increasingly prevalent in higher education institutions, with immersive virtual environments gaining significant traction in practical teaching. These platforms effectively integrate interdisciplinary knowledge, deliver "hyper-realistic" scenarios, provide diverse teaching resources, and enable optimal visual and behavioral interactions Yang and Zhang (2021). Consequently, they are recognized as a game-changer for overcoming pedagogical challenges and enhancing teaching quality, leading to widespread adoption. This approach proves particularly valuable in engineering, medical, and military disciplines where hands-on training involves high-risk, potentially destructive procedures Liu and Zhang (2018). As a discipline closely tied to virtual simulation, digital media art education exemplifies this integration. Consider the traditional jade carving jewelry design course: before students fully master the techniques, they risk excessive material waste. Given the limited availability of precious jade resources and the inefficiency of conventional methods, virtual simulation courses in digital media art effectively address raw material depletion through realistic scenario reconstruction and material authenticity.

3. The Aesthetic Deficiency of Virtual Simulation Teaching Course Scene Design

Through field visits to multiple virtual simulation enterprises and observations of virtual simulation teaching projects at selected universities, it has been found that most virtual simulation teaching scenarios prioritize realistic fidelity and practicality. However, a common issue persists: an excessive focus on technological realism at the expense of aesthetic appeal and user experience. As shown in Figure 1, while some systems achieve "hyper-realistic effects" by faithfully reproducing objects, most merely simplify real-world items by retaining only essential features while omitting non-essential details. Moreover, the visual effects often appear monotonous and uniform, resulting in a dull aesthetic experience that lacks any sense of beauty.

Figure 1: Virtual simulation teaching scene on the network

Note: The image is sourced from the internet

4. The Role of Aesthetic Experience in Virtual Simulation Online Course Teaching

4.1 Aesthetic Experience and Aesthetic Beauty of Virtual Simulation Scene

Although virtual simulation technology can restore the real world to a large extent, it still cannot restore the real world, and most scenes will still lack details. If people long-term use "humble" virtual simulation scenes as aesthetic experience, it will greatly destroy the real perception of aesthetic subject to aesthetic object, and reduce the texture of aesthetic experience of art works.

It undermines the subtlety and richness of aesthetic subject's experience and perception of aesthetic objects, depriving them of the ability to make aesthetic choices and create. Aesthetic choice is the prerequisite for discovering and experiencing beauty, reflecting the subject's insight and understanding of the object's value and meaning Chang (2019). Without aesthetics, the capacity for aesthetic creation is lost. Virtual simulation teaching scenarios lacking details and aesthetic appeal may lead students to become overly reliant on computer programs with prolonged use, thereby diminishing their aesthetic appreciation. Boring virtual simulation course projects fail to resonate with students or spark their interest in aesthetic reflection.

Therefore, the quality of aesthetic experience can influence the students' aesthetic level and aesthetic reflection ability.

4.2 Conflict between Artificial Intelligence Interaction and Aesthetic Experience in Virtual Simulation Scenarios
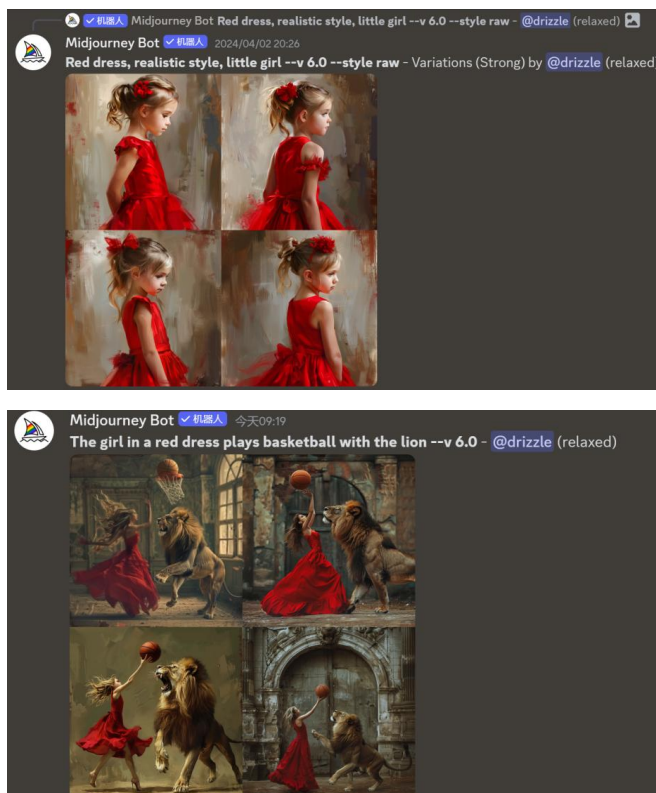
When comparing virtual simulation with graphic and video-based teaching methods, its greatest advantage lies in interactive capabilities. Virtual simulation's interactivity primarily falls into two categories: visual interaction and behavioral interaction. Visual interaction refers to the interaction between computer-generated graphics and human vision when humans operate machines. Behavioral interaction, on the other hand, creates a virtual

simulation world through artificial intelligence and information technology, where humans participate as active participants.

The virtual simulation world composed of digital coding is a world full of "programming" and "deception". In the visual interaction, it can "deceive" the human eye very strongly, generate all things you want to see, make people passively accept the virtual "reality", and make people rely on the "reality".

Stable Diffusion and Midjourney are open-source AI-powered image generators that create high-quality visuals within seconds based on user input. As shown in Figure 2, typing "a girl in a red dress" produces the left image, while "a girl in a red dress playing basketball with a lion" generates the right one. These tools can produce even the most absurd or impossible scenarios imaginable. Through continuous AI advancements, they now replicate techniques from historical masters, with their "painting skills" rivaling those of professional artists. Yet such "works" strip aesthetic experience of meaning. When virtual reality completely replaces human perception, and digital imagery substitutes physical reality, people become passive consumers. Without integrating artistic sensibility and critical reflection during creation, without developing creative thinking, humanity gradually loses its creativity. Art gets industrialized, devoid of depth and originality, producing cookie-cutter images that rarely offer meaningful aesthetic experiences. Liu (2021)

Figure 2: Midjourney Image

Note: The image is sourced from the Midjourney

The virtual simulation constructs a 'world' that fundamentally conflicts with traditional aesthetic experiences. Whereas contemplative observation in conventional aesthetic processes enables boundless exploration of the unknown, rigid procedural generation stifles imaginative freedom and erodes innate aesthetic sensitivity and creative potential. (Wang & Ju, 2022)Therefore, virtual simulation instruction in design arts should transcend the confines of 'reality' and instead prioritize 'infinite' exploration.

As shown in Figure 3, virtual simulation's behavioral interaction primarily adopts two forms. Most implementations utilize controllers for hand simulation, while some employ motion capture for gestures. However, the excessive flexibility of human hands makes it challenging to capture subtle hand movements, and the lack of high-quality depth sensors hinders implementation (Hu, 2018). Consequently, this technology has not yet achieved widespread adoption, with controller-based operations remaining the predominant method.

Figure 3: Pico Neo 3 VR all-in-one controller
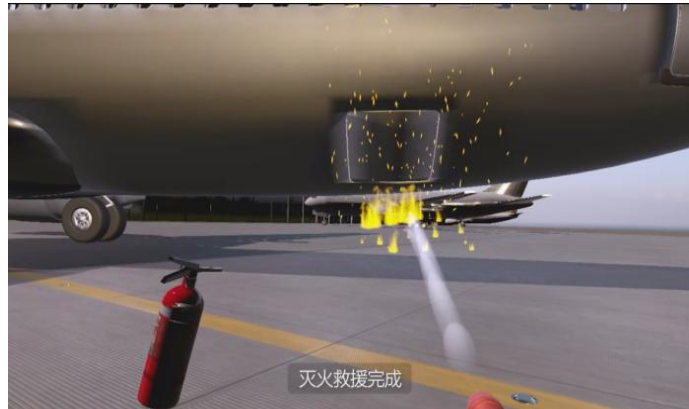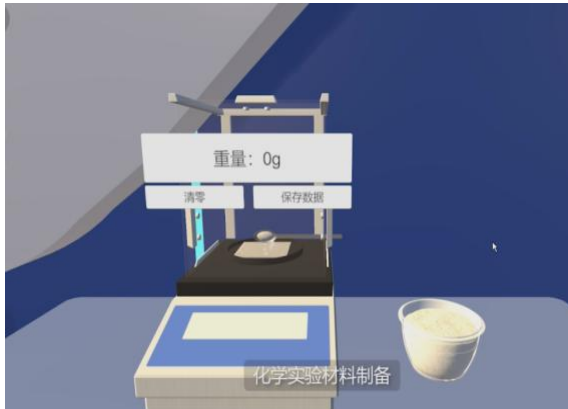

Figure 4: Hand motion capture

Note: The image is sourced from the internet

However, the controller-based interaction mechanism has inherent limitations, primarily manifesting in two critical issues: 1. Over-simplified operational procedures 2. "Rigid" and "one-dimensional" practical outcomes. The first scenario, illustrated in Figure 5, showcases interface designs for mainstream virtual simulation teaching content. These interfaces are exceptionally straightforward, requiring minimal manual input. Users simply click desired steps on the controller, triggering automated system execution. For instance, in the chemical experiment material simulation shown below, virtual assistants automatically complete reagent dispensing without physical intervention. Such virtualized interactions strip users of authentic participation, depriving them of aesthetic engagement – how can genuine aesthetic experience develop under such constraints? The second scenario, depicted in the rescue operation demonstration, features pre-programmed procedural sequences and predetermined outcomes that prevent any unexpected variations. Yet natural-world scenarios are inherently dynamic. If creative outputs were predetermined, they would lose their creative value. Expanding possibilities for spontaneous occurrences remains crucial for

developing aesthetic experiences in artistic virtual simulation course environments.

Figure 5: *Network Virtual Simulation Control Interface*

Note: *The image is sourced from the internet*

5. Exploration of Aesthetics in the Scene Design of Virtual Simulation Online Course of Digital Media Art

The analysis shows that the current virtual simulation online course scene construction is mainly divided into two aspects: the scene is too inclined to experience the real function, while ignoring the role of aesthetics. In addition, the behavior interaction is too single, which is easy to appear the interaction process boring, the process experience boring, the result limited, and the imagination expansion restricted.

In the process of constructing the virtual simulation online course scene design of digital media art, we should pay more attention to the combination of aesthetics and real reproduction, and at the same time, we should pay attention to the openness of the virtual simulation practice interaction results, which are the two key points of the virtual scene construction of the course.

5.1 Improving the Aesthetics of Virtual Scene Construction

Should the focus of virtual reality in art education be solely on "authenticity" or "reproduction"? Beyond achieving realistic reproduction, greater emphasis should be placed on whether virtual environments can create aesthetic experiences and sensations. By grounding these in richer sensory experiences, we can subtly enhance students 'aesthetic appreciation through the teaching process. Art courses can also incorporate diverse creative elements, breaking away from conventional realistic settings to stimulate students' imagination and elevate their creative thinking.

5.2 Diversification of Virtual Scene Construction Behavior Interaction

In the field of aesthetics, this manifests as follows: From the perspective of practical aesthetics, beauty is fundamentally rooted in practical and creative freedom. Beauty embodies the significance and value of practical freedom, allowing individuals to perceive their own essence through aesthetic practice and experience, thereby achieving the "objectification of human essential power." The optimization of behavioral interactions in virtual simulation course scenarios can be approached in two ways: First, expanding from single-click operations to interactive creation processes. For instance, a saw for crafting jewelry could be designed to allow users to drag and cut it back and forth using a controller, enhancing the hands-on experience and user engagement. Additionally, the design of practical processes can incorporate artificial intelligence to

introduce multiple outcome-oriented features, rather than being limited to merely presenting results.

As depicted in Figure 6, this is an art ceramics production course. The varying firing temperatures during the process create distinct effects, resulting in unique outcomes even among batches of identical ceramics. While traditional modeling methods would require unimaginable computational resources, artificial intelligence can effortlessly simulate diverse results. Expanding the resource library broadens students 'imaginative horizons and enhances their aesthetic reflection skills in teaching. Beyond aesthetic experience, students' artistic creation requires artistic imagination—a form of "divine thought." Ordinary people use associative thinking to connect objects, which is basic "association." However, artists transcend this by combining insights gained from aesthetic experiences with actual contexts while transcending reality to create. Abundant material resources provide vast space for such "association."

Figure 6: *Virtual Simulation Course for the Production of Artistic Ceramics*

Note: *The image is sourced from the internet*

"Creative imagination" serves as a fundamental prerequisite for artistic creation, while the second essential element is the development of technical proficiency—a crucial aspect of technical guidance in digital media art virtual simulation course design, which constitutes professional foundational knowledge. Here, the authenticity of virtual simulation technology proves invaluable. By meticulously recreating realistic scenarios, it enables students to master core operations and acquire essential skills. Scene construction should emphasize professional skill practice, logical procedural guidance, and refined detail optimization. Furthermore, art-oriented virtual simulation courses must prioritize open-ended experimental design. Take jewelry crafting as an example: during the welding process, varying techniques yield distinct outcomes. This process can be replicated at different scales, with probabilities determining unique results. Occasionally, unexpected discoveries may emerge through different material compositions and ratios.

The purpose of the guiding conclusion is to let the students know the making process, and the open design is not to frame the "end", so that the students can develop their imagination space, and then form a new creation.

6. Conclusion

This study investigates the aesthetic design of virtual simulation online course environments, analyzing current challenges in digital media art education and proposing corresponding solutions. While virtual simulation technology has achieved remarkable success in realistic reproduction and practicality, it still falls short in aesthetic experience. To enhance learners' aesthetic literacy and reflective abilities, virtual simulation environments must balance visual appeal with authenticity while emphasizing interactive diversity and openness.

This study highlights the significance of aesthetic experience in virtual simulation teaching. An aesthetically rich virtual environment not only stimulates learners' interest but also guides them toward deeper aesthetic reflection and artistic creation. Therefore, designers should prioritize integrating aesthetic elements when creating virtual simulation teaching scenarios, aiming to develop environments that are both visually appealing and educationally meaningful.

Furthermore, advancements in artificial intelligence technology have unlocked new possibilities for virtual simulation-based education. AI not only generates high-quality virtual content but also enhances learners' engagement and practical experience through intelligent interactions. However, we must remain vigilant against the potential for AI to foster homogenization and proceduralization, ensuring we avoid over-reliance on technology at the expense of the essence of artistic creation—human creativity and imagination.

In conclusion, future virtual simulation teaching designs should prioritize aesthetic value realization and artistic creativity freedom while ensuring technical authenticity and functionality. By providing diverse interactive experiences and open-ended practical outcomes, we can cultivate a new generation of art professionals who possess both technical expertise and refined aesthetic sensibilities. This represents not only educators' responsibility but also a new challenge posed by technological advancement to the art field. We anticipate that through the joint advancement of artificial intelligence and digital media art, virtual simulation teaching will achieve more comprehensive and profound development, paving new pathways for art education.

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