Using VR as a Conceptual Design Tool in an Apparel Design Classroom

Jennifer Elaine Stanley, Hae Jin Gam, and Chanjuan Chen
University of North Texas

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The applications of virtual reality have proven to be an effective educational tool in various classrooms, serving as a method for embodied learning (Johnson-Glenburg, 2018), especially when in a distance learning environment. In addition, virtual reality learning can be used to promote sustainability in the classroom (Gam & Banning, 2020; McQuillan et al., 2020) and to enhance creativity for design students (Lee et al., 2021a). Previous studies (e.g., Lee et al., 2021a) have also indicated that this technology can support instructors and students when distance learning is required for safety reasons, such as during the COVID-19 pandemic.

Scholars have used virtual reality for 3D fashion sketching and as inspiration for garment design (Lee et al., 2021b; Starkey et al., 2021). Sketching in 3D through virtual reality can provide increased conceptual thinking and visual conception in the design process (Lee et al., 2021b). Therefore, the purpose of this study is to explore the virtual reality application in the fashion design course to improve students' creativity. More specifically, this study investigated students' translation of the experience of fashion sketching in virtual reality to their finished garment design. This study builds on previous research and knowledge by exploring student design outcomes using virtual reality and will provide the implication to fashion design educators.

The newly developed design project was introduced to college juniors and seniors in a fashion design studio course, *Fashion Draping*. This course is required for Fashion Design majors as it is essential to train them to work in the industry. The objectives of this course included learning basic draping techniques, transferring drapes into finished garments, creating new pattern styles using the taught principles, and developing skills needed for effective visual communication as viewed through three-dimensional design. As creativity is emphasized to be successful in this course, the course instructor introduced equipment and software which can be used for design sketching stage of their design process. The University Library offered the *Fashion Draping* students the space to use VR equipment as follows: HTC Vive, Oculus Quest, and Valve Index. The software students used to sketch in a 3D environment was Google Tiltbrush. One class day was reserved for a field trip to the media library where the course instructor and media librarian gave a demo on how to use the VR equipment as well as the software. Students were then given the opportunity to create their own 3D fashion sketches (Figure 1). After students completed their virtual 3D sketches, students utilized the image from virtual experiences to create an actual sewn garment. The instructor also addressed learning the principles of draping, including drape exercises, drape transfers, and muslin construction, for the project, *Using VR as a conceptual design tool*.

Figure 1- fashion sketches in virtual reality

The learning objective of this assignment was for students to incorporate their new skills of draping on the dress form in conjunction with new technology to produce a final sewn garment (Figure 2). The challenge for students was to start their design thinking process in a 3D environment, and then drape their design onto the dress form, completely forgoing the traditional method of transferring flat sketching to patternmaking and construction. To evaluate the effectiveness of the project, this study utilized pre and post surveys, and the survey distributions were guided by the IRB. Before introducing the projects, students who enrolled in fashion draping completed the pre-survey (N = 25). Pre-survey asked questions about their previous experience with virtual reality, the design process description. After the fashion design students completed the project, the post survey was distributed, and 23 students completed the post survey. The post survey asked questions about the virtual reality design learning experience, the description of design process through a virtual reality tool and willingness to use the virtual design process in the future. In addition, students' demographics were also asked in both surveys.

Figure 2- final garments from project

Collected student responses were compiled in a single document and analyzed using open coding, where themes were labeled and grouped (Strauss & Corbin, 1998). Among 25 students, only two students indicated they previously used virtual reality in other courses (e.g., history of costume). In addition, most of the students (N=23) indicated identifying or researching inspirations as the first step of the design process followed by sketching their designs. For the question about virtual reality as a design tool, about half of the students (N=14) indicated that virtual reality could be an interesting and innovative design tool, while the other half addressed that the new tool is intimidating (N=5), and they prefer hand or 2D drawing (N=3). For the post

survey, three themes in their learning experiences were identified and they were 1) learning a new tool helping to improve creativity, 2) engaging and enjoyable learning experience, 3) changing and intimidating but rewarding experience. In addition, for the question about the design process description, students' response to the overall descriptions of the design process were not that different than responses in pre-surveys. However, students indicated that using virtual reality to create sketches helped them make rewarding modifications to their original design plan (N=22). Most of the students (N= 17) indicated that they are willing to use this tool again for their design inspiration. However, a few students addressed some concerns such as accessibility and complexity in using a new tool in the design development process.

Based on student feedback, we concluded that the new project enhanced the learning experience, capturing the leaner's attention and improving their interest, resulting in a positive and productive outcome. However, to implement this project in future courses, instructors will need to modify the learning environment (such as increasing the library visits and private setting), and investigate other tool and software options.

References

Gam, H. J., & Banning, J. (2020). Teaching Sustainability in Fashion Design Courses Through a Zero-Waste Design Project. *Clothing and Textiles Research Journal, 38*(3), 151–165. https://doi.org/10.1177/0887302X20906470

Johnson-Glenberg, M. C. (2018). Immersive VR and Education: Embodied Design Principles That Include Gesture and Hand Controls. *Frontiers in Robotics and AI, 5*. https://www.frontiersin.org/article/10.3389/frobt.2018.00081

Lee, J. H., Yang, E. K., Lee, E. J., Min, S. Y., Sun, Z. Y., & Xue, B. J. (2021). The use of VR for collaborative exploration and enhancing creativity in fashion design education. *International Journal of Fashion Design, Technology and Education, 14*(1), 48–57. https://doi.org/10.1080/17543266.2020.1858350

Lee, J. H., Yang, E., & Sun, Z. Y. (2021). Using an Immersive Virtual Reality Design Tool to Support Cognitive Action and Creativity: Educational Insights from Fashion Designers. *The Design Journal, 24*(4), 503–524. https://doi.org/10.1080/14606925.2021.1912902

McQuillan, H. (2020). Digital 3D design as a tool for augmenting zero-waste fashion design practice. *International Journal of Fashion Design, Technology and Education, 13*(1), 89–100. https://doi.org/10.1080/17543266.2020.1737248

Starkey, S., Alotaibi, S., Striebel, H., Tejeda, J., Francisco, K., & Rudolph, N. (2021). Fashion inspiration and technology: Virtual reality in an experimental apparel design classroom. *International Journal of Fashion Design, Technology and Education, 14(*1), 12–20. https://doi.org/10.1080/17543266.2020.1844807

Strauss, A., & Corbin, J. (1998). Basics of qualitative research (2nd ed.). Thousand Oaks, CA: Sage Publications.