Children's Sketch Challenge: 2D to 3D Concepts for Apparel Design Students using VStitcher

Sarah West Hixson, University of Arkansas
Juliana Marconi, University of Arkansas
Gillian Shrum, University of Arkansas

Keywords: 3D printing, 3D modeling, pedagogy, digital to physical

Introduction

The intersection of digital and physical design is emerging as a key concept within apparel design education (Taverner et al., 2021). This project was completed in partial fulfillment of a graduate-level complement to a digital design course with an emphasis on Browzwear VStitcher for product development. The undergraduate course develops 3D garment design skill sets, especially within VStitcher. As part of the graduate-level course, the graduate student and instructor facilitated a novel approach to solidifying 2D to 3D conceptualization via the creation of digital garments based on sketches provided by children at the child study center on campus. 3D designs were then printed with the additional support of an undergraduate student that completed the course and was working to continue their learning related to 3D. The successful integration of digital and physical design processes in this project demonstrates the value of incorporating emerging technologies like 3D garment design software, 3D printing, and innovative collaborations into apparel design education, providing students with critical design skills for the apparel industry.

Theoretical Framework

Understanding 2D to 3D concepts is paramount for apparel students due to its relevance in flat pattern development as well as emerging 3D technologies (Liu & Jang, 2013). Within that scope, 3D design and printing facilitate a deeper understanding of spatial concepts and enhance communication and creativity in educational settings. This is particularly relevant when incorporating children's sketches and software skill development. For this project, it was important to consider pathways of learning for apparel students and the potential challenges and opportunities with using children's sketches.

Actively engaging with materials builds understanding (Pardjono, 2016). When apparel students design, create, and reflect on 3D designs, they engage more deeply both as individuals and collaboratively (Chan & Lee, 2021; Park et al., 2011; Smith-Glaviana, 2023). To encourage this process, it is important to unnecessary cognitive load, allowing the learner to focus on the task rather than the basic skills required to complete it (Ackerman, 1988). The integration of 3D printing technology in education also provides an opportunity to develop software skills that align with the skills used in 3D garment design, reducing the chance of such overload (Kwon et al., 2017). As students learn to use 3D design to create garments and printable models, they gain proficiency in a valuable skill set that is increasingly relevant in the apparel industry. This process not only enhances their technical abilities but also fosters a deeper understanding of 3D design and its potential applications.

The use of children's sketches to create 3D designs presents a potential barrier to learning but also an opportunity for increased creativity and critical thinking. Attempting to incorporate novel design methodologies or elements can potentially overwhelm design students still developing their design skills, such as using virtual reality or augmented intelligence for inspiration or as design tools (Adel El-Nahas, 2021; Binhajib et al., 2023; Starkey et al., 2021).

Incorporating children's sketches into the 3D design process can foster creativity and individual expression, as students must interpret abstract ideas into a successful design as a collaboration (Sun & Starkey, 2018). Therefore, the challenge within this innovative approach to learning is leveraging the positive outcomes for student engagement while also balancing the difficulty related to learning 3D design.

Objectives

The primary objective of this project was to foster a creative and dynamic learning environment where undergraduate students can develop their skills in digital design and 3D visualization using VStitcher. The project was developed to enhance undergraduate student engagement and motivation by incorporating the imaginative perspectives of childrens' sketches into the design process and communicating 2D to 3D concepts through 3D printing. This project cultivated technical proficiency, encouraged students to explore the creative potential within VSticher, and conveyed how 3D design software can be communicated to physical design.

Methodology

Undergraduate students were given a pre-survey to assess their perceptions of using children's sketches as well as 2D to 3D concepts. Then, students were given the opportunity to choose a sketch created by a child from the child development study center on campus. The children had a concurrent module on fashion and 4 and 5-year-olds used croquis and colored pencils to develop their sketches. Students then interpreted the sketches and translated them into digital designs using VStitcher. These designs were then rendered into 3D printable items, printed using PLA on an AnyCubic KobraMax 2, and dispersed to students before being shared with the children, providing a tangible connection between 2D sketches and 3D products. The designs were shared with the children through StyleZone to show color choices. Their feedback was incorporated into final projects for students who opted to use this design as their final project. Post-surveys were collected to evaluate changes in their perceptions of using children's sketches as well as 2D to 3D concepts.

Results and Discussion

Observations and survey responses suggest that the integration of children's sketches into the design curriculum has a positive impact on student engagement. Students responded with excitement and joy to the sketches, quickly dedicating themselves to achieving the child's vision. This project was introduced as the assignment directly preceding the final project, so it is recommended that students have some proficiency with VStitcher before implementing this project to increase the likelihood of such a positive response (Ackerman, 1988).

The tangible outcomes of the course, in the form of 3D-printed garment objects, serve as a potential tool for instructors striving to convey 3D concepts to apparel students. Survey results showed that 2D to 3D conceptualization improved after the project. Additionally, feedback suggests that students did not clearly understand the 3D aspect of design until interacting with the printed model. Further research will provide insights into the effectiveness of this approach, with a focus on how strategies can be refined and improved for future iterations of the course.

Conclusion

The successful integration of digital and physical design processes in this project demonstrates the value of incorporating emerging technologies like 3D garment design software, 3D printing, and innovative collaborations into apparel design education. By providing students with opportunities to develop critical skills in 3D visualization, software proficiency, and

creative interpretation, this project prepares apparel designer students for the evolving demands of the apparel industry. The integration of children's sketches further enhances the learning experience, fostering creativity and a deeper understanding of the transition from 2D to 3D design concepts. As apparel design education continues to move toward 3D technologies, embracing these innovative approaches will be crucial in equipping students with the necessary knowledge and skills to thrive in the apparel industry.

References

Adel El-Nahas, M. M. (2021). The Impact of Augmented Reality on Fashion and Textile Design Education. *International Design Journal*, *11*(6), 39–52. https://doi.org/10.21608/idj.2021.204886

Binhajib, A., McKinney, E., & Eike, R. (2023). Examining apparel design students' self-efficacy towards using virtual reality in the design process. *International Journal of Fashion Design, Technology and Education*, *16*(2), 175–185. https://doi.org/10.1080/17543266.2022.2140362

Chan, Cecilia. K. Y., & Lee, Katherine. K. W. (2021). Reflection literacy: A multilevel perspective on the challenges of using reflections in higher education through a comprehensive literature review. *Educational Research Review*, *32*, 1–18. https://doi.org/10.1016/j.edurev.2020.100376

Kwon, Y. M., Lee, Y.-A., & Kim, S. J. (2017). Case study on 3D printing education in fashion design coursework. *Fashion and Textiles*, *4*, 1–20.

Liu, Y. M., & Jang, H. K. (2013). A study on the functional characteristics of apparel 3D CAD system. *Advanced Materials Research*, *627*, 501–505.

Pardjono, P. (2016). Active learning: The Dewey, Piaget, Vygotsky, and constructivist theory perspectives. *Jurnal Ilmu Pendidikan*, *9*(3).

Park, J., Kim, D.-E., & Sohn, M. (2011). 3D simulation technology as an effective instructional tool for enhancing spatial visualization skills in apparel design. *International Journal of Technology and Design Education*, *21*, 505–517.

Smith-Glaviana, D. (2023). University Students' Experience of a Digital Fashion Exhibition: Engagement, Embodiment, and Object-Based Learning. *Clothing and Textiles Research Journal*, 0887302X2311616. https://doi.org/10.1177/0887302X231161641

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

Sun, L., & Starkey, S. (2018). The Visual and Abstract Minded: Exploring Spatial Visualization in Apparel Design and Product Development. *International Textile and Apparel Association Annual Conference Proceedings*, *75*(1).

Taverner, C., Trojan, L., Simion, O., & Szkudlarek, E. (2021). Design culture in the era of industry 5.0: A review of skills and needs. *Cultural Management: Science and Education*, *5*(1), 41–58.