Equipping apparel design students with the knowledge of 3D/ 2D simulation technologies:
A case study and its implications for curriculum development

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In the competitive global apparel industry, fast-changing fashion trends and offshore sourcing of production necessitate flexibility and efficiency for product development and communication among designers, manufactures, and retailers. Three dimensional (3D) virtual prototyping technologies have potential to offer solutions for minimizing lead times and costs associated with product development (Sayem, Kennon & Clarke, 2010). 3D body scanning and 3D Computer Aided Design (CAD) systems can be used to generate realistic body models, develop patterns, and simulate digital garments onto body models. When these 3D technologies are fully adopted it will be vital for apparel designers in the near future to exhibit competency in using these technologies for product development, communication and collaboration with cross-cultural and global distributed teams. Geographically dispersed teams can evaluate virtual garment prototypes for fit and communicate pattern and material issues over the Internet without producing a typical range of 2-10 physical prototypes for one style (Easters, 2012; Sayem, Kennon & Clarke, 2010).

A recent focus group study with apparel designers and senior management level personnel indicated the necessity and need of using 3D technologies in apparel design education (Easters, 2012). These technologies can improve spatial cognition of students and enable them to understand complex concepts and manipulate objects within the virtual environment (Park, Kim & Sohn, 2011).

In this case study, we focused on understanding the capabilities of an emerging 3D to 2D software (OptiTex[TM] Flattening), its ease of use, and how it can be implemented into a product development course. Unlike a typical 2D/3D patternmaking software where a designer can digitally stitch existing 2D patterns and drape them onto a body model or avatar to evaluate the fit, with OptiTex[TM] Flattening pattern pieces can be directly drawn on a 3D virtual body model and extracted as 2D patterns.

A [TC][2] NX-16 3D body scanner was used to scan a 19-year old female fit model and create her virtual avatar. The garments designed for this study were two close-fitting dresses, with a sweetheart neckline and princess seam lines. The pattern creation process for the garments enabled us to learn new aspects of the software. OptiTex[TM] Flattening was user friendly when importing the body scan avatar into the program and drafting the patterns directly onto the model's avatar.. We could plot, measure, and move points around the avatar with ease, creating the design lines to the exact expectations dictated by the garment styles. However, transferring the patterns from the model to the workspace, from 3D to 2D, were difficult in OptiTex[TM]

Flattening. The patterns did not transfer to the workspace with the pre-measured segments determined on the model, therefore the patterns needed to be re-measured and adjusted. After this process, patterns were virtually stitched and draped on the avatar. Once the patterns were printed and the actual dresses were produced, we compared the virtual fit with the actual fit to measure OptiTex^{TM} Flattening's efficiency.

The findings indicated that, 3D to 2D pattern making software, such as OptiTex^{TM} Flattening, can be adopted in product development courses to obtain basic slopers for various body models of real people. Adding notches, darts, and adding and moving points along the patterns in the software were easy and quickly learned. It was possible to see the effects of 2D pattern modifications on the drape and fit of the virtual dresses immediately. Transference of the patterns from the model (3D) to the workspace (2D) is an area that the software can be improved.

The comparison of the virtual and actual fit of the dresses showed 3D simulation technologies' capability of providing realistic visual output for fit evaluation, therefore underlining their importance for reducing the number of physical prototypes during product development. It should be taken into consideration that if students' expectations from these technologies are high, they may feel frustrated easily because design development would require continuous modifications of multiple digital samples. However, as indicated by Park et al. (2011), despite their technical limitations, using such technologies in apparel design education are beneficial to improve spatial visualization skills of students. Virtual prototyping with 3D body scanning and 3D to 2D simulation software can be implemented not only in product development courses such as patternmaking and draping, but also in courses which teach global sourcing and design communication. As a next step, we plan to continue this research by developing class activities and assignments on 3D simulation technologies, integrating them in the aforementioned courses and examine the ways these technologies can facilitate product development and design communication.

References

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