Breaking the Barriers of Disability with Cotton Performance Technologies: An Experiential Learning Opportunity for Technical Design and Omnichannel Retailing Students

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More than 40 million people in the United States have a disability, many of whom report that clothing is a significant barrier to societal participation (Kabel, McBee-Black, & Dimka, 2016; U.S. Census Bureau, 2004). Some of these barriers for people living with a disability (PLWD) are the result of poor functioning fabrics. The fabric-related issues PLWD often cite as barriers in apparel include (a) lack of outerwear with protective features, (b) ill-performing fabrics that inhibit regulation of body temperature or cause skin irritation, and (c) clothing made from fabrics that lead to safety issues (i.e., slick fabrics that make transferring from a wheelchair to another location dangerous) (Kabel, McBee-Black, & Dimka, 2016). Furthermore, Kosinski, Orzada, and Kim (2018) argue that, "…most apparel designers have not been trained to design for alternative markets such as … the disabled [and]…future designers need to be prepared for a market that encompasses all body types…" Therefore, the purpose of this project was to provide students in a Technical Design (TD) course and an Omnichannel Retailing (OCR) course with an opportunity to explore innovative materials and design approaches as mechanisms to reduce apparel-related barriers for PLWD. This project, funded through a competitive grant from the Importer Support Program of the Cotton Board and Cotton Incorporated, was developed as an impetus for students to apply, and promote cotton innovations for adaptive apparel products that have performance and aesthetic value for PLWD.

Table 1. Course activities for both TD and OCR courses.

Time	Technical Design Activities	Omnichannel Retailing Activities
Weeks 1-3	Build foundational knowledge of cotton technologies; explore adaptive apparel clothing design principles	Build foundational knowledge of Omnichannel retailing; review Cotton, Inc. and NBZ current OCR strategies
Weeks 4-6	Interview target consumer; apply knowledge of cotton, adaptive apparel, and user needs to create initial designs	Explore omnichannel customer behavior Gather information on PLWD and their shopping behavior toward cotton products
Weeks 7-10	Revise design concepts based on OCR presentation & begin initial tech packs; revise 1st prototypes	Extract useful information from pre- identified data including social media data; develop Omni channel solution for PLWD
Weeks	Develop 2nd prototype; revise 2nd	Develop mock websites for co-branding
11-13	prototype; construct final garments	product line; revise omnichannel solution
Weeks 14-16	vide record final presentations; document final projects	Video record final presentations; document final projects

The instructors approached the project from a holistic product development perspective where cross-functional TD teams cooperated with OCR teams throughout the 16-week semester through a real-life case study of an adaptive apparel retailer, NBZ Adaptive International (NBZ). NBZ is an online adaptive apparel retailer producing jeans for adults and children with Down syndrome, Multiple Sclerosis, Cerebral Palsy, among others (NBZ Apparel, Intl., 2019). In this project, the case study provided the instructors with an opportunity to bring cotton-related teaching into the classroom through an applied learning format (Austin & Kelly, 2012). The instructors of both courses reframed the delivery of the course learning objectives so that each course objective directly related to the case study. As illustrated in Table 1, throughout the semester six TD teams developed cotton-rich adaptive apparel products and corresponding technical specifications that addressed actual market needs and twelve OCR teams analyzed the adaptive apparel market to produce mock websites and social media content promoting cotton as a barrier-breaking fiber for adaptive apparel.

In both courses, the primary epistemological approach for the projects was a user- centered design perspective whereby researchers and practitioners design objects based on explicit understandings of end-users. Following this philosophy, students in TD interviewed four PLWD about their experiences with apparel. The interviewees represented a range of disabilities ranging from spinal cord injury to Ehlers-Danlos syndrome. Students in OCR conducted exhaustive secondary research regarding the shopping experiences of PLWD through online resources. Students in both courses actively engaged with stakeholders from Cotton, Inc., NBZ, and end-users of adaptive apparel in a public symposium hosted by the instructors. To evaluate the course format and topic, the instructors measured student learning and engagement through a mid-semester survey with four open-ended questions and a semi-structured group interview with each team at the end of the semester.

Teaching Effectiveness: Students in both courses stated they found value as well as, challenges when employing user-centered design and case studies in both the TD and OCR courses. A majority of students, (92%), provided positive comments regarding teaching effectiveness. For example, one student said, “Ultimately, I really like the user-centered design approach because we are getting to the root of the human need and it helps with my learning because I can see how every human is different, as well as their needs.” Another student stated this about the case study approach, “All the information and resources that I’ve gained from these two case studies is not only useful for this semester's design project, but also beneficial for my future.” However, the students were also critical of integrating these sometimes disparate aspects into the course objectives, for example one student said, “It seems like an unnecessary addition to the class. It has made the project and lectures, feel disconnected… like it is hitting multiple different subjects that don't feel cohesive.” Therefore, the authors acknowledge that it takes skilled educators who can tie all the different aspects of a course of this nature into a cohesive approach that makes sense to students. In addition to giving students an opportunity to explore innovative materials and design approaches for adaptive apparel, the authors also sought to provide students with insights into a holistic product development process. In doing so, the authors acknowledge the need to articulate the interconnected activities of developing products in a real-life work environment, particularly to those who are not well versed in the apparel development process.

Implications and Contributions: Overall, the instructors believe that a project of this nature was essential to prepare students for a changing retail landscape where there is a greater focus on designing for underserved apparel markets. This holistic project added value to the TD and OCR curriculum by replicating the cross-functionality required for those working in the apparel industry and provided students with experiences working with an adaptive apparel company and end users through a user-centered design approach. This model project provides educators with an example of how to integrate a case study with an emphasis on user-centered design into their courses to engage a variety of students in discussions about adaptive apparel, material innovation, and omnichannel promotion strategies to ensure that apparel is innovative and meeting the demands of the market.

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