



Pedagogical Guidance to Educators in Teaching a Sneaker Design in a Fashion Design Program

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Introduction. In this teaching abstract, we report on the development of a new experimental course in a product development program, including product development using a highly advanced technology. There is a lack of pedagogical guidance in sneaker design course curricula provided by universities in the United States and most students in the faculty's program had little experience with sneaker design. When teaching fundamental content on sneaker design processes with informative footwear design books, such as *"How Shoes Are Made"* by Motawi (2015) and *"Footwear Design"* by Choklat (2012), it is challenging for educators to demonstrate shoe prototyping without specific shoe-making equipment. To address this concern, we examined students' creation of a sneaker prototype by integrating fabric recycling, 3D modeling, and 3D printing.

3D printing technology applications have been extended to various disciplines and industries (e.g., healthcare, aeronautics and space, industry design, and automotive). Well-known sport footwear companies, such as Adidas, Nike, and Under Armour, have utilized 3D printing applications in the design features or on the soles of their shoes. For example, the manufacture of Adidas sneakers has included a 3D printing technology to create the outsoles of the shoes (Cheng, 2018). Therefore, course curriculum is crucial for college students to learn and obtain a variety of educational content and technical skills to meet needs in fashion and footwear industries. Our expectation was for students upon course completion to:

1. Define basic footwear and foot anatomy.
2. Apply the concepts of sneaker design and development for target consumers in footwear industries.
3. Identify current trends and issues in footwear industries.
4. Understand shoe design processes, including key elements of sketching, pattern making, material selection, and prototype of sneakers.
5. Demonstrate knowledge and application of professional terminology associated with footwear industries.
6. Incorporate computer technology (3D modeling software & 3D printing) into creating the prototype of sneakers.

Purpose and Goals. The faculty goals were to implement of an intensive experimental sneaker design class for eight weeks (three credits) and aimed to improve students' sneaker drawing skills and knowledge of the design and sneaker manufacture processes incorporating 3D printing. The pedagogical process was guided by the following questions: (a) What content, skills, and technology do educators require to effectively develop and deliver a sneaker design course? (b) What skills and level of proficiency, for example sketching, pattern-making, and 3D printing, do shoe design educators instill in

students for effective sneaker prototype development? and (c) What does a framework look like to provide pedagogical guidance for teaching sneaker design courses for apparel and fashion design/product development educators.

Course Outline and Evaluation. Each course session during an eight-week course period was delivered via a mini-lecture (10-20 minutes) and active learning (60-70 minutes) in their teaching of three main content sections of the course: (a) sketching, (b) pattern-making, and (c) 3D printing. Throughout the course, the faculty evaluated course learning outcomes to determine improvements for future courses (see Table 1).

Table 1. *Learning Activity and Evaluation*

Week	Activity	Content Section	Evaluation
1	Sketching the side view of sneakers while practicing five different designs	Sketching	Educators should: <ul style="list-style-type: none"> • incorporate more computer-aided design (e.g., shoe design software). • spend more time introducing different views of shoes. • assign sketching of each view of the sneakers as homework. so there is more class time at the end of the eight weeks for sneaker construction.
2	Sketching the bottom of sneakers with two or three perspectives and back view of sneakers while practicing five designs, respectively		
3	Sketching the upper view of sneakers while practicing five different designs Students also presented two of five images for their final project outline		
4	Pattern-making 1 with fabrics using shoe lasts, 3D plastic molds	Pattern-making	Educators should: <ul style="list-style-type: none"> • request more tools for pattern-making. • create more individual assignments rather than general assignments. • require pattern-making and apparel assembly processes course experience as prerequisites.
5	Pattern-making 2 with recycled fabrics using shoe lasts		
6	Pattern-making 3 with stitching with the fabrics		
7	Learning how to make outsoles incorporating Sketch-up software with a 3D printing application	3D printing	Educators should: <ul style="list-style-type: none"> • allow more time to learn the 3D modeling software. • supply a variety of polymer materials for 3D printing. • encourage experimentation with various methods of assembling upper shells and outsoles. • implement both self-evaluation and peer-evaluation during the course.
8	Assembling upper shells by hand stitching or using glue with outsoles made using a 3D printing application		

Suggestions and Future Plans. The overall content and delivery were effective in teaching the structure of sneakers and design process during the eight-week course, as demonstrated in the students' final prototypes. Through sketching sneaker sections, students can start brainstorming and generate their own creative ideas. In addition, educators could seriously consider requiring recycled or reused materials (e.g., old t-shirts, jackets, and jeans) when developing a sustainable shoe course, because most students prefer using textiles and recycled clothing to create their patterns and prototypes of shoes. Students who want to become creative and technical shoe designers in the industry can obtain further understanding of the importance of selecting suitable materials. The faculty experience teaching the course enabled the creation of a framework that may be useful to other educators in similar apparel or fashion design programs.

References

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