# That's a wicked looking tater: An interdisciplinary approach to solving 'wicked' agricultural issues using fashion product development.

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**Introduction:** The sweet potato industry in Mississippi generates more than $130 million dollars in economic impact. However, due to consumer preferences related to size, shape, and aesthetic, more than 30% of annual harvests are considered cull (undersized or misshapen) potatoes. While a portion of these cull potatoes are used in processed or frozen foods, the current surplus far exceeds the market demand. The current situation leads to losses for growers of millions of dollars in product value. Additionally, since the crop matures underground, it is difficult to determine the percentage of cull sweet potatoes for a season until they are harvested and processed, leaving growers in a financial limbo. Processors and growers are presented with a 'wicked problem' – what to do with all the leftover sweet potatoes? Wicked problems are complex with three main characteristics: (1) unstructured, (2) multiple, overlapping, subsets of problems crossing disciplines and expertise; (3) relentless and ongoing. The purpose of this presentation is to illustrate how a wicked problem in agriculture is being approached from a variety of disciplines and the role fashion and textile courses play in this network.

**"The Challenge":** The Sweet Potato Innovation Challenge (SPIC) is a USDA funded project that combines Extension outreach, teaching, and research to find tangible solutions to a wicked problem directly affecting agriculture producers. As part of the campus-wide innovation challenge, a course offered in fashion product development focused on learning and applying various design processes to create an innovative solution to the cull sweet potato issue.

In stage 1 students enrolled in participating SPIC courses were introduced to the problem, visited with farmers to learn about sweet potato production, began developing novel sweet potato-containing products and submitted a brief product proposal to The Challenge committee. If the proposal was approved the teams developed a conceptual product pitch, with target markets, technical designs, early stage P&L, etc. At the conclusion of stage 1, students presented their final conceptual product designs to a panel of judges. Teams were provided feedback and encouraged to opt-in for stage 2. The challenge for students in the fashion product development course was to utilize different creative design processes to develop a new product related to their field using cull sweet potatoes and present a market analysis and product pitch to the evaluation panel. During stage 1, students worked within teams from their respective discipline.

In stage 2 students continued to develop their product with the guidance of a faculty mentor in order to create an advanced prototype that could be marketed to an industry partner and or investor. However, during stage 2, all teams were required (to receive startup funding of ~$2,000/team) to register for a seminar lab to work on the project each week. During the introduction, teams were reorganized and/or new members added based on the judges' feedback and team identified challenges during stage 1. For instance, a team developing a filament from

sweet potato starch realized the need for a chemical engineer. Therefore, they 'poached' one from another team to help with product development. Another team needed a sustainable bio-products expert and sought out a graduate student to join their team as an advisor and mentor in that respective discipline. In the end, at least 3-4 different disciplines were represented on each team, including a fashion student on each team. Products developed from the SPIC include, but not limited to, the following examples: leather, filament, cosmetics, ink/dye, skin/hair care products, and molded bioplastics – with many of the products being a biodegradable option for current market counterparts.

**Interdisciplinary Approach:** Solving this wicked problem takes more than just interdisciplinary student teams, but also an interdisciplinary faculty team. A fashion/textiles faculty and the director of a campus entrepreneurship center team taught the stage 2 product development seminar lab. Support faculty from Extension, food science, chemical engineering, marketing, and management attended the class and provided mentorship and expertise. The course was taught in a single 2-hour block during the evening, when most of the building was empty, allowing the teams and faculty to focus on the problem at hand.

Traditional design and product development processes have followed a linear progression and/or operated within a structured system. However, the researchers approached stage 2 product design through a sociality of problem formulation method, whereas the students are intermixed across disciplines facilitated by the open physical space of an empty lab room. Stage 2 teams are brought into the space and are responsible for locating tables, chairs, etc. to set up team work stations. This open work space concept allows for the transfer of ideas and questions between teams and the course facilitators. Whiteboards located in the middle of the lab space were used to formulate rubrics, brainstorm ideas, or propose provocative questions to stimulate thinking. Teams used funds from the USDA Higher Education Challenge Grant to buy supplies, equipment, and materials to develop a prototype within 4 months.

**Discussion:** Not many people immediately associate fashion and sweet potatoes, or chemical engineering, or even agriculture. However, involving fashion design and merchandising students with the SPIC presented a unique opportunity to teach and engage with a wicked problem that demands interdisciplinary work. With an ever changing fashion and textiles industry, the skills needed for success are rapidly changing as well. Globalization has introduced larger more complex problems than ever-before, requiring a variety of skills and expertise to correct. This project enabled faculty to provide an experience unlike any other in current coursework, by not only tackling a wicked problem with students, but structuring interdisciplinary networks into the problem approach. Each team successfully developed and pitched a prototype based on their original conceptual ideas during a trade show to investors, industry partners, and stakeholders, which showcased their solution to this problem. Industry partners and stakeholders were impressed with the level of complexity and innovativeness, but mostly the ability of the teams to work together was a highlight. Based on student feedback, the opportunity to work with other disciplines, from students to faculty, gave them a new perspective and created questions they had not thought of based on their experiences. This approach and project design allows both teaching and research faculty to expand beyond their discipline, and begin to tackle wicked problems facing our communities, our industry, and our planet.