NC-AAAE Innovative Idea Poster Session Proceedings

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Acknowledgements

For this conference, 14 posters were reviewed in the Innovative Idea Category. Twelve posters were accepted (86% acceptance rate).

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Innovative Idea Poster Session

A Model for Virtual Engagement in Extension Curriculum
Dr. Julie Garden-Robinson, Dr. Brooke L. Thiel, & Alicia L. Lund
North Dakota State University

Generating Program Enthusiasm Using University Teach Ag Pennants
Dr. Sarah E. LaRose
Purdue University

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Iowa State University

Hey! Look What I Found!
Gaea Hock
Kansas State University

Meet Your Meats: Integrated STEM Lessons
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Purdue University

Mining the Mind through Collaborative Objects of Agricultural Learning (COALs)
Emily R. Perdue, Silpa Beegala, Ary Mosley, Jaclyn Vance, Jason D. McKibben, James R. Lindner
West Virginia University, Auburn University

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Dr. Sarah E. LaRose
Purdue University

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Justin Pulley, Dee Jepsen
The Ohio State University

Teaching Creatively with Authentic Inquiry Cohorts Due to COVID-19 Disruptions
Blake Colclasure
Doane University

Teaching Identity & Inclusion in Agricultural Education for General Education Credits
Donna Westfall-Rudd, Rashawn Franklin, Frank Adarkwa
Virginia Tech

The Climate Change Curriculum Challenge: Crowdsourcing novel topics in climate change science education from current secondary educators.

Carson Letot, Rachna Tewari, Melanie Miller Foster, Daniel Foster

Penn State University

Using Implicit Bias Education in an Undergraduate Course to Enhance Student Development and Achieve Course Objectives

Scott D. Scheer

The Ohio State University

A Model for Virtual Engagement in Extension Curriculum

Introduction/Need for Innovation

In March 2020, Extension educators throughout [state] were scheduled to launch school-based and afterschool programs to reach thousands of elementary-age children and families with food and nutrition programming. All programming ceased due to the COVID-19 pandemic. By April, food preparation (and baking) at home became widespread during the pandemic, as evidenced by shortages in some foods, including yeast and flour, at grocery stores due to supply chain issues and widespread purchases. We needed to innovate quickly to continue to reach children and families.

How the Innovation Worked

We moved forward in new ways using a variety of innovative approaches to involve not only children, but also their families and our community partners. The "Kids Baking School" curriculum for ages 9 and older was developed at [college/university] in March-April 2020 by a registered dietitian with a Ph.D. in Cereal Chemistry and Food Technology. It taught children how to make pancakes, pretzels, tortillas, pizza crust and scones. The objectives of Baking School for youth ages 8 and older were to a) increase knowledge and confidence in performing basic food preparation/life skills, b) expand culinary knowledge of terminology, c) improve knowledge of food science and food culture, and d) improve safe food handling skills, and e) to increase whole-grain intake after participating in hands-on sessions in person (when allowed) or virtually.

What truly made the curriculum innovative was through the use of Google Sites to deliver the content virtually to youth and family unable to attend extension workshops face-to-face due to the pandemic. The five-lesson curriculum consisted of hands-on lessons (about two hours each) that could be delivered virtually through the Google Site. Each virtual lesson featured interdisciplinary activities, including math, science, history and culture with engaging activities and visual aids. Videos and photos were included to replace live baking demonstrations that would normally happen in a face-to-face workshop. A workbook was developed that included lesson activities that could be completed by students at home with the assistance of their parents. Additionally, the lesson plans provided objectives, key concepts, worksheets, associated recipes, and overall evaluation tools. The lesson topics included measuring, reading recipes, identifying and using equipment, safe food handling, reading nutrition labels, food science experiments, and baking. Each child received a cooking kit and cookbook with supplementary recipes at the conclusion of the program.

Extension agents who offered the program virtually assembled baking kits for students with the necessary ingredients and tools to complete the virtual baking school. Several community partners and collaborators, including dietetic interns and Extension agents played an integral role in the development of those kits. We were awarded flour coupons for educators to receive free bags of flour and $2,000 from the North Dakota Wheat Commission to help us provide cooking kits and ingredient kits. In addition, the National 4-H Council/Walmart

Foundation provided funding for the supplies, so children could participate at little, if any, cost to their families. An adult supervisor (such as a parent) was required to supervise at home.

Results to date/implications

We used a pre-survey and post-survey, approved by our Institutional Review Board (IRB) prior to administration. Extension agents in 10 counties have used the program with 134 participants (mainly virtual, 10 to 12 hours of instruction per child) who had significant gains in knowledge scores. About 88% reported being "totally confident" or "confident" in their baking skills after the program, with the remaining, "somewhat confident." Parents have noted their children being more independent at home (90%), offering help at home (68%), and being confident using measuring tools and other equipment (87%). After completing the program, 93% of children indicated they could follow a recipe and 93% of children also shared they could follow food safety guidance at home.

Future plans/advice to others

The use of Google Sites ended up being an excellent platform for the curriculum. Though it is essentially open-access since it is not password protected, it was free to use, easy to navigate, and quick to develop. We recommend the use of Google Sites for others hoping to develop online learning modules to share with the public.

We do plan to move additional curriculum to Google Sites for Extension agents who plan to continue to offer virtual programs in their counties. A number of participants expressed an interest in attending future program from home. An unexpected positive side-effect of the online nature of the Kid's Baking School was the parent and child interaction during the baking labs.

For other Extension programs hoping to offer virtual programing, we would encourage the use of multiple modes of delivery of content. We provided participants with videos, photos, written recipes with step by step instructions, and a handbook that outlined expectations. This gave participants multiple ways to accomplish the goals of each learning module and baking lab.

Costs/resources needed

Google Sites is available free of charge. The only additional costs, which would be optional for future iterations of this program were the baking kit (which included tools such as measuring cups, an apron, oven mitt, mixing bowl, whisk, etc.) was $15 and the box of ingredients provided to virtual participants was about $12-17 (though the amount changed from county to county depending on the cost of groceries).

Innovative Idea Poster

Generating Program Enthusiasm Using University Teach Ag Pennants

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Introduction

In 2018, Purdue University revised and updated the undergraduate Agricultural Education major to reflect the changing needs of the profession in Indiana. Stakeholder feedback expressed dissatisfaction with elements of the teacher preparation program, and at the same time, changes occurred with faculty in the program. The program is now implementing the changes, and keeps Agricultural Education teachers throughout the state apprised of the changes being made. At the same time, the Purdue Agricultural Education program is seeking to increase recruitment efforts, strengthen relationships with Indiana Agriculture teachers, and build an updated brand identity. Given that many agriculture classrooms feature plaques, pennants, and banners for achievements within FFA (Roberts, Stair, & Granberry, 2020), the Purdue Ag Ed program designed Purdue Teach Ag pennants to be distributed to graduating seniors and their cooperating teachers to recognize their investment in the future of Agricultural Education.

How it Works

One Purdue faculty member generated the initial idea and design for two different pennants in Spring 2020. They worked with an agricultural communications departmental staff member who refined the design and put it into the format required by an area printing company. Two different pennant designs were created: 1) Large pennant: 12” x 30” horizontal felt pennant featuring the FFA owl, university logo, and Teach Ag logo, and 2) Small pennant: 4” x 10” vertical felt pennant featuring the university logo at the top, a blank space, and a small FFA owl on the bottom. The large pennants are distributed to graduating Agricultural Education seniors at the end of the semester in which they student teach. The large pennants are also awarded to teachers serving as cooperating teachers for Purdue Ag Education student teachers. The small pennants have a small open space between the university logo and the FFA owl. Student teachers sign their name and the semester in which they student taught in this small space. The Ag Education program then sent thank you letters along with the large and small pennants to cooperating teachers. The Purdue Ag Education program envisions teachers hanging the small owl pennants below or around the large Purdue Ag Ed pennant in their classroom or office. Instead of competition, these pennants represent their dedication to the future of the Ag Education profession. See Figure 1 for an example of the layout of the pennants in a cooperating teacher’s classroom.

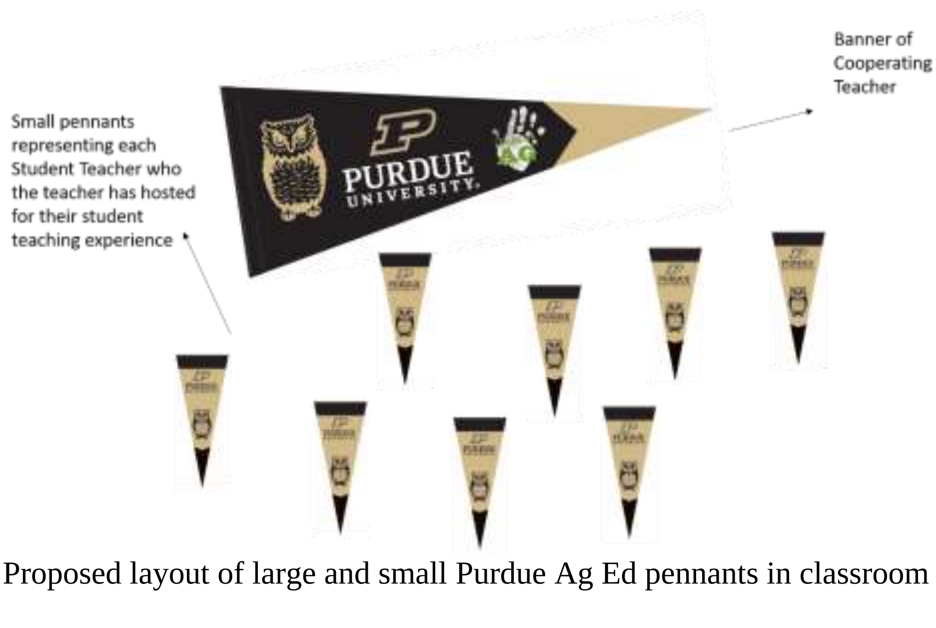

Figure 1. Proposed layout of large and small Purdue Ag Ed pennants in classroom setting.

Results to Date/Implications

So far, 41 students have graduated from the Purdue Agricultural Education Program since beginning distribution of the Purdue Teach Ag Pennants with May 2020 graduates. We did not distribute cooperating teacher large pennants and student teacher small pennants until May 2021 due to complications from COVID-19 restrictions. There were 14 student teachers in the Spring 2021 semester. Some students taught under the supervision of two cooperating teachers, so each teacher received a large pennant and a small pennant.

Since on campus meetings of student teachers were permitted in 2021, Purdue faculty and staff were able to distribute the pennants face-to-face with the student teachers, unlike the 2020 cohort. Graduating students were so excited to receive their large pennants that they requested to take a group photo together with their pennants, while some even ventured around campus together to take photos with their pennants at significant sites. Still others featured their pennants in their formal graduation photos. One student seemed particularly mesmerized by their pennant, staring quietly at it after receiving it. When a faculty member asked them about it, they responded, “Oh, I just love it so much! I can’t stop looking at it!”

When Purdue faculty announced this new tradition at the statewide virtual winter workshop for the Indiana Association of Agricultural Educators, multiple Agriculture Teachers expressed excitement for the pennants. Some even asked how they might purchase one. The Purdue faculty and staff decided to limit distribution of the pennants to graduating seniors and cooperating teachers to add to the distinctive nature of the pennants. When this was announced to workshop participants, some teachers reached out to find out the requirements of becoming qualified to host a student teacher in the future. This might become an incentive to serve as a cooperating teacher.

Future Plans/Advice to Others

We intend on continuing this program into the future, and potentially feature social media posts that highlight the Purdue Ag Ed pennants in the classrooms and offices of recipients. It is important to make sure that use of your institution’s logo follows your institution’s branding requirements, and to keep the design simple and uncluttered. It is also important to keep track of who received pennants so that you can keep an accurate inventory. This is especially important for our program, as we decided that the pennants would be awarded to only graduating seniors and cooperating teachers. If a program decided to use pennants such as these as a fundraiser, then a different recordkeeping system might be warranted.

Costs/Resources Needed

We ordered 250 large pennants and 250 small pennants. The printer we worked with offered bulk discounts, and we wanted to reduce the number of times we placed an order. It cost $875 to order 250 large pennants that featured 5 different colors, and $377.50 to order 250 small pennants featuring 2 different colors. Our university’s Agricultural Education program has a designated gift fund that usually funds the cost of printing program newsletters that are mailed to stakeholders and alumni. Since we did not print or mail newsletters in 2020 due to COVID-19, we were able to use those funds to purchase and mail these pennants. We will need to explore other sources of funding in the future when we need to order more pennants. It was extremely helpful to have departmental staff with design expertise, and an administrative support professional who assisted in ordering and distribution of the pennants to cooperating teachers.

References

Roberts, R., Stair, K. S., & Granberry, T. (2020). Images from the trenches: A visual narrative of the concerns of agricultural education majors. *Journal of Agricultural Education, 61*(2), 324-338. https://doi.org/10.5032/jae.2020.02324

Getting Creative When the World Shuts Down: Moving Experiential Learning Online

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Introduction

Education is a fundamental part of our world and comes in many forms which ranges in both depth and breadth (Halpern & Hakel, 2002). In agricultural education, experiential learning is common approach and has been widely embraced as a true learning methodology (Clark et al. 2010). While it's been noted that John Dewey is arguably the father of experiential learning (Roberts, 2006), many agricultural educators use Kolb's Experiential Learning Theory (ELT) as a framework for their teaching. Kolb's (1984) ELT provides a cyclical approach that helps take learning to a deeper level. Baker and Robinson (2016) concluded that experiential learning provided better scores in creativity, practical knowledge, and richer learning experiences.

In agricultural education, many implement the strategy of learning by "doing." However, one of the greatest challenges for today's teachers and students of agriculture is to move beyond the "doing" and ensure that all learning is connected to thinking and knowledge that will be easily remembered and applied later in life (Knobloch, 2003). Experiential learning provides a cycle for a deeper, richer learning to take place (Baker & Robinson, 2018). Ideally, experiential learning takes place in a practical setting such as a classroom or laboratory. Students get to practice and experiment applying their knowledge in a real-world way. It is critical that students then take this knowledge with them into the future. What happens when the ideal experiential learning environment now moves into a virtual, stagnant location?

In the world of COVID, lives and roles changed. Everything we knew to be true started to be questioned. In a pandemic, you must adjust, you must expand your thinking and ultimately, you must find a way to survive. This did not affect just the students, teachers with children and responsibilities at home were also impacted (McKim & Sorensen, 2020).

Imagine a college student, not much older than the students they are observing, walking into a high school classroom for the first time in two years. Imagine that student nervously watching the experienced teacher craftily work their way around a room making sure each student is engaged in the lesson. Students are laughing, intrigued and learning about agriculture. Now, imagine that in a virtual world. Classrooms sat empty, offices closed, and bedrooms became the place that learners now studied, worked out and slept.

How it works

In the fall of 2020, students in COURSE at a UNIVERSITY would have normally been observing in-person classes at a local high school agricultural classroom. Students are required to learn through observations, reflections, teaching, interviews and other experiential learning opportunities. However, due to COVID, those experiences were moved online. Students were now required to complete experiential learning through a computer screen. This component of the teacher education prep program is critical in helping future educators gain meaningful experiences in the high school classroom. Typically each student would manage their own learning. This would take place at one school, and they would submit a portfolio of materials at the end of the semester. Moving into a virtual format, a need to adjust the structure of the course was quickly discovered. How would the requirements and objectives of the course be met all online?

Many new strategies and methods were created and implemented into the fall 2020 and into spring 2021 course. The first virtual ELT strategy came via the requirement for pre-service teachers to complete teacher observational hours. This normally is a time for pre-service teachers to get a glimpse into a high school classroom to see teacher movement, watch student interactions, record questions of higher order thinking and observe classroom management practices. Instead of observing only one classroom at one school, pre-service teachers were now able to view multiple classrooms. School-based agricultural education (SBAE) teachers from around the state volunteered to allow pre-service teachers to observe their classroom and laboratories virtually and see their live teachings which entailed multiple teacher demonstrations, group presentations, peer learning, team-based learning, and many other rich learning experiences. These classes took place for the high school students both in-person and online. Additionally, teachers and current student-teachers submitted recordings of themselves teaching lessons for students to observe.

The next virtual ELT strategy came by students expressing the desire to learn from each other's observations and experiences. To facilitate this, three virtual meetings were offered for students to share observations, ask questions, and provide resources to each other. These sessions created a space for students to develop meaning in their observations. They were also able to present challenges to each other and discuss potential solutions.

Results

It is understood that active learning through the use of multisensory techniques can also help with retention of learning (Vaughan et al., 2017). Students were presented with a challenge out of their control. Their learning environment was completely changed. Although the learning was different, these future educators are well-equipped to be successful in the future.

The changes implemented for fall 2020 and spring 2021 provided students with an opportunity to learn and grow. Instead of observing one classroom, students were able to learn from multiple teachers and see various teaching and learning styles. They also got to connect with teachers from across the state; instead of just those in close proximity to campus. Learning how to be persistent, flexible, and creative are also unique characteristics and skills they might not have practiced had it not been for these changes.

Ultimately, the semester was a success. Evaluations showed that students were happy with the experience they were given. While not ideal, there was a lot of upside to the new model. We saw students adapt and overcome and get creative to gain the experiences needed to be ready to lead in their own classroom. Since incorporating virtual ELT strategies and methods, it may lead to a hybrid model in the future.

Future Plans

While it is expected to return to in-person observations for fall 2021, the flexibility provided by online observations cannot be dismissed. Students were able to observe multiple teaching methods and connect with schools beyond a reasonable driving distance to campus. The hope is that most observations will return to in-person but some hours could be completed virtually. Additionally, the class meetings, where students could learn from each other and share their stories, will be kept. Students will also be encouraged to interview a current agriculture teacher more than 50 miles from campus. This will force the students to get creative in setting up their interviews, likely virtual, but will allow them to expand their reach beyond the usual teachers we are able to interact with.

According the four principles of Andragogy (Knowles, 1984) suggest involving the students in the planning and evaluation of the course. Based on Knowles principles, my advice to others would be to allow students to present their own ideas and become more involved in ways to meet the objectives of the course. When we listen to the students, we are better connected to what is important to them and understand their style of learning. Future educators are creative, and we should model and cultivate a space for pre-service teachers to have the opportunity to continue the transformation from dependent learning to self-directed learning (Knowles, 1984).

Resources

No financial resources were needed for these innovative changes. The biggest resources needed were time and support. Teachers volunteered in various capacities to support these new ideas. They provided videos, moved technology around their classrooms and spent time supporting future educators. Technology was an additional resource. Online storage was needed for recordings and video capability, like zoom, was necessary for students to interview agriculture teachers and to view classrooms live.

References

Baker, M., & Robinson, S. (2016). The Effects of Kolb's Experiential Learning Model on Successful Intelligence in Secondary Agriculture Students. *Journal of Agricultural Education*, *57*(3), 129–144. https://doi.org/10.5032/jae.2016.03129

Halpern, D. F, Hakel, M. D. (2002). Leaning that lasts a lifetime: Teaching for long term retention and transfer. New Directions for Teaching and Learning, 89 (3), https://doi.org/10.1002/tl.42

Knobloch, N. A. (2003). Is Experiential Learning Authentic? *Journal of Agricultural Education*, *44*(4), 22–34. https://doi.org/10.5032/jae.2003.04022

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Upper Saddle River, NJ: Prentice Hall.

McKim, A. J., & Sorensen, T. J. (2020). Agricultural Educators and the Pandemic: An Evaluation of Work and Life Variables. *Journal of Agricultural Education*, 61(4), https://doi.org/10.5032/jae.2020.04214

Roberts, T. G. (2006). A Philosophical Examination of Experiential Learning Theory for Agricultural Educators. *Journal of Agricultural Education*, *17*(1), 17–29. https://doi.org/10.5032/jae.2006.01017

Vaughan, K. L., Vaughan, R. E., Seeley, J. M., & Vaughan, K. L. (2017). Experiential Learning in Soil Science: Use of an Augmented Reality Sandbox. *Natural Sciences Education*, *46*, 160031. https://doi.org/10.4195/nse2016.11.0031

Hey! Look What I Found!

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Hey! Look What I Found!

Introduction/Need for Innovation

The need to quickly locate and effectively utilize new and innovative teaching resources was evident throughout the last academic year. The COVID-19 pandemic forced teachers to quickly innovate as they had to shift to teach in environments they were not used to (Daniel, 2020). They also had to quickly locate resources and learn new technology (Bushweller, 2020).

Agricultural education teachers were among the educators scrambling to locate and implement teaching strategies to meet the educational needs of their students (Linder et al., 2020). Preservice teachers were also experiencing shifts to their own educational setting as they trained to enter a classroom and teach their own students. To prepare for the future, it is imperative preservice teachers learn how to utilize emerging technology to best educate their students (Kelly, 2019).

Teacher educators do not and should not be the experts on all possible resources, platforms, and pedagogical tools. Exposing preservice teachers to as many educational platforms as possible is important, but also challenging. They should be encouraged to seek out resources for themselves and provided the time needed to explore. They also need time to learn from their peers (i.e. colleagues) (Boss, 2018) by sharing what they discover. Developing these skills is a critical first step in meeting the professional development needs (Eck et al., 2021) of all teachers.

How it Works/Methods/Steps

Agricultural Education students in the teaching methods course at Kansas State University were asked to explore resources, websites, and other educational tools throughout the semester to build their resource library. At the end of the semester, they were allowed the opportunity to share their best resource with their peers. They were challenged to find something unique and innovative others would benefit from knowing about and using in their future classroom.

After students identified their item, they “claimed” it on a shared Google Doc so their peers could see, and no item was repeated. They each had to write a brief “white paper” and prepare a short discussion to highlight the item with their peers.

The “white paper” guidelines included: one to two pages in length, eye-appealing and easy to read. They were submitted by November 30 via Canvas. The papers were evaluated on how clearly the idea, teaching method, technology, or other resource was communicated in written form. The layout and design needed to make it easy for someone to use the resource. The presentation component was held via Zoom on December 1 and December 3. Each student signed up for their “slot” on a shared Google Doc. They were provided 10 minutes to share their resource, allow their classmates to “practice” using it, and answer questions. A rubric was shared with the students prior to the assignment deadline. Each component was worth 50 points for a total of 100 points.

Results to Date/Implications

This assignment allowed students to find educational resources on their own, share them with their peers, and evaluate what would be the most impactful in their future classrooms. The resource sharing went above expectations. Eighteen students completed the *Hey! Look What I Found!* idea-sharing during the fall semester. Their items are displayed in Table 1.

Table 1

Hey! Look What I Found! Idea Sharing Topics

Kansas ORKA GIS map for legal land description	Online Jeopardy
Forever Blue Network	Owl Pellets: Tips for Ag Teachers Podcast
Germinate Professional Development	Pear Deck with Google Slides
Green and Growing Podcast	Perfectly Planned by ATD and Ag Teacher Buddies
Grow Next Gen website - GMOs: What do you know? Breakout	Plant and Soil Science e-library
Histology guide website	Small Gas Engines Book Hobart
How to share YouTube videos without ads	Trello
Idaho Grasses app	UNL Myology Interactive Lab
Journey 2050	Weed ID guide

Kansas State University finished the semester online. The Zoom sharing process was a great platform for each student to quickly share, their peers to practice (if appropriate), and questions/links to be posted in the chat.

Students indicated they appreciated the time to share what they had found and to quickly learn 17 other items they could put into practice during the spring semester student teaching experience.

The idea sharing was such a hit, we repeated the activity in the spring semester to allow the student teaching interns to share what they discovered during their first few weeks in the classroom. During that session, students were placed in three groups. They gave a one minute "sales pitch" about their idea and then went into breakout rooms to learn more about a specific resource.

Future Plans/Advice to Others

This assignment stayed in the syllabus for the next year with small modifications in the points (decreased to 50 points) and method of sharing (in person rather than online). Like the impact of "innovative ideas" at a research conference, the *HLWIF!* assignment allowed students to share a diverse set of tools and educational practices they planned to use or had already started using. They had the freedom to select the item/resource they felt was most relevant and worthwhile to share with their peers. This freedom did yield a wide range of "usable" resources, not all being technology focused.

Costs/Resources Needed

There is no cost associated with this assignment. Resources required include technology to demonstrate the resources and allow students to engage with relevant tools during the presentation (i.e. Zoom, Google Docs). Time during the semester or a separate professional development day is required.

References

Boss, S. (2018, March 14). *3 Ways to Unlock the Wisdom of Colleagues.* Edutopia. https://www.edutopia.org/article/3-ways-unlock-wisdom-colleagues

Bushweller, K. (2020). *How COVID-19 is shaping tech use. What that means when schools reopen.* Education Week. https://www.edweek.org/technology/how-covid-19-is-shaping-tech-use-what-that-means-when-schools-reopen/2020/06

Daniel, S. J. (2020). Education and the COVID-19 pandemic. *Prospects,* 49, 91-96. https://doi.org/10.1007/s11125-020-09464-3

Eck, C. J., Layfield, K.D., DiBenedetto, C. A., & Gore, J. (2021). School-Based Agricultural Education Teachers Competence of Synchronous Online Instruction Tools During the COVID-19 Pandemic. *Journal of Agricultural Education, 62*(2), 137-147 https://doi.org/10.5032/jae.2021.02137

Kelly, K. (2019, May 10). *Preparing preservice teachers in the digital age through real-world classroom connections.* International Literacy Association. https://literacyworldwide.org/blog/literacy-now/2019/05/10/preparing-preservice-teachers-in-the-digital-age-through-real-world-classroom-connections\

Linder, J., Clemons, C., Thoron, A., & Linder, N. (2020). Remote instruction and distance education. A response to COVID-19. *Advancements in Agricultural Development, 1*(2), 53–64. https://doi.org/10.37433/aad.v1i2.39

Meet Your Meats: Integrated STEM Lessons

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Introduction

Middle and high school students can be engaged in learning science, technology, engineering and mathematics (STEM) through Agriculture, Food, and Natural Resources (AFNR). Integrated STEM education is defined as “the approach to teaching the STEM content of two or more STEM domains, bound by STEM practices within an authentic context for the purpose of connecting these subjects to enhance student learning” (Kelley & Knowles, 2016). In our lesson, we wanted to implement student-centered teaching and the engineering design process. STEM education can connect scientific inquiry to engineering design by developing questions that can be answered through discovery to inform students before they begin the engineering design process to find solutions (Kennedy et al., 2014). Meat science is a relevant topic for students because meat is an essential protein and enjoyed by many youth. As such, an integrated STEM unit was designed for grades 6-12 in an afterschool program. The purpose of this unit was for participants to gain knowledge about meat science and food safety through STEM-related activities, and how to marinate meat for better flavor and palatability using the engineering design process,by applying multidisciplinary learning approaches. Implementing effective STEM through AFNR education allows for students' future success and motivates students to careers in STEM fields (Stohlmann et al., 2012).

How it Works

This unit integrates learning standards from the Indiana Department of Education in STEM through an experiential learning method. This lesson was designed to promote knowledge of fresh red meat quality and different cookeries to the younger generation to increase meat palatability and food safety for more families.

The five-lesson unit incorporates AFNR as both the content and context of student learning. The first lesson starts with “where your meat comes from and what is meat color?” where participants will learn the locations of various meat cuts, why meat changes color, and what meat color means from a meat quality perspective. In the second lesson, students learn USDA beef quality grades and what water holding capacity has to do with color and juiciness. The third lesson is about cut selection and the safe handling of meat products. Participants learn about the variations in meat tenderness based on the muscle locations within the carcass and commonly missed places during hand washing. The fourth lesson is about technologies used to improve the tenderness and function of different types of marinades. Participants learn to apply the engineering design process by determining what marinade is best for various meat cuts provided and identify the roles of marinade. The last lesson is about end-point cooking temperatures and cooking methods best suited for different cuts. In this lesson, participants learn why and how to use a meat thermometer in relation to food safety and eating experience. Integrated STEM through AFNR helps enhance participants’ learning experiences and development of problem-solving as well as critical thinking skills through the application of obtained knowledge into real-life scenarios (Wang & Knobloch, 2020). The unit is very flexible; although it was intended to be taught as a whole, each lesson can be used individually with some modifications to better fit any curriculum.

Two lessons were implemented sequentially by two instructors in an online after-school program--Meet Your Meats Part 1 and Part 2. The sessions were presented as part of Purdue University’s PK-12 outreach event known as the Virtual Ag+STEM Camp. The presenters adapted topics and activities from the five lessons to be combined for the two sessions. These topics included: where your meat comes from, meat color, marbling, basic USDA beef quality grade, tenderness, methods of tenderization, and final end-point cooking temperature. Activities were modified to include only ordinary household items to facilitate student participation in a virtual setting. For methods of tenderization, paper towels were used to represent meat. Students were asked to perform different tasks with three pieces of paper towels to mimic mechanical, brine, and no tenderization. Students received visual and hands-on feedback on the effects of the various methods of tenderization of meat through the activity.

Results to Date

Two sequential virtual STEM sessions that included basic meat science knowledge and activities were generated from the unit. A total of 12 students participated in the virtual lessons. All participants actively took part in question-based class discussions and the end-of-session assessments presented in the format of Kahoot game. The Kahoot assessments' results showed that participants comprehended the content. An online survey was sent to the participants after the completion of the program to collect students' feedback. Participants rated positively on their experiences and the virtual lessons. The overall engaging class environment, especially considering the sessions were taught virtually, and positive participant feedback suggested that students enjoyed the various topics of meat science covered in the two-part STEM sessions.

Future Plans/Advice to Others

The unit was developed to be taught as a whole to provide students a thorough understanding of basic topics of Meat Science. However, each lesson can be utilized individually with some modifications. Ideally, the entire unit will be implemented in-person in the future. Teaching the unit in-person will likely maximize hands-on experiences through the activities embedded in each lesson plan to enhance student learning. For example, a sensory test where students can taste a variety of meat to better understand the differences in tenderness could be accomplished in an in-person setting. Educators who wish to continue the online format can modify the activities to be virtual friendly to help students stay engaged and better their learning experience. A limited number of participants was the major challenge encountered during implementation. To address the challenge, the program should increase the number of students allowed to register per session and potentially add small incentives or consequences to ensure attendance after registration. Ideally, the lessons can reach larger student audiences in future implementations, and more data could be collected to assess the unit's overall effectiveness, especially through student feedback.

Costs/Resources Needed

All the resources required for lesson implementation were included in the lesson plan. A list of materials needed for execution is provided for each lesson in the unit and costs of materials could vary based on activities implemented. For example, the cost for conducting activities in-person (e.g., taste test) would be higher than lessons taught online. Computer and Mentimeter access are highly recommended for unit implementation. In-person teaching cost would be higher due to printing supplies for student handouts, physical copies of USDA Grading Supplies (Marbling Pictures about $26.25/set, etc.), various types of steaks for sensory testing (market price), meat thermometers ($15-$100+), and playdough (product specific). A total cost estimate of the complete lesson plan implemented in-person would differ based on the variety and depth of the taste test, which can vary largely depending on instructor preference. Relatively fewer financial costs are associated with the online implementation of this unit because most pictures, and materials such as interactive websites are free for public access.

References

Indiana Department of Education. (2016a). *Fourth Grade Resources (updated 2020).* https://www.doe.in.gov/standards/fourth-grade-resources

Indiana Department of Education (2020a). *Indiana Academic Standards Mathematics: Grade 4.* https://www.doe.in.gov/sites/default/files/standards/grade4-math-standards-dec-2020.pdf

Indiana Department of Education (2020b). *Indiana Academic Standards Mathematics: Grade 5.* https://www.doe.in.gov/sites/default/files/standards/grade5-math-standards-dec-2020.pdf

Indiana Department of Education. (2017). *Middle School Program Framework.* https://www.doe.in.gov/sites/default/files/standards/middle-school-et-standards2016final2.pdf

Indiana Department of Education. (2016b). *Sixth Grade Resources (updated 2019).* https://www.doe.in.gov/standards/sixth-grade-resources

Kelley, T.R., Knowles, J.G. A conceptual framework for integrated STEM education. IJ STEM Ed 3, 11 (2016). https://doi.org/10.1186/s40594-016-0046-z

Kennedy, T., & Odell, M. (2014). Engaging students in STEM education. Science Education International, 25(3), 246–258.

Stohlmann, M., Moore, T. J., & Roehrig, G. H. (2012). Considerations for Teaching Integrated STEM Education. Journal of Pre-College Engineering Education Research (J-PEER), 2(1), Article 4. https://doi.org/10.5703/1288284314653

Wang, H., & Knobloch, N. (2020). Preservice educators' beliefs and practices of teaching STEM through agriculture, food, and natural resources. *Journal of Agricultural Education, 61*(2), 57-76. https://doi.org/10.5032/jae.2020.02057

Mining the Mind Through Collaborative Objects of Agricultural Learning (COALs)

Introduction/need for innovation or idea

According to data from the United States Census Bureau [state] is the least educated state in the country (U.S. Census Bureau, n.d.). A little over 21% of the state population has a bachelor's degree. The most recent data from the [state] Higher Education Policy Commission (2018) states that of the 18,880 high school graduates in 2018, 45.2% enrolled in higher education institutions in [state]. About 47% of students enrolled at [state university] are [state] residents. The [state] P-20 program was established to increase access to higher education in rural [state]. The P-20 model is an early college program that moves students through a curricular framework that highlights career training and research-based STEM integration beginning in third grade and culminating with a capstone research project in twelfth grade. This program was implemented in the [school district] in [county], [state]. Through this program, students have the opportunity to experience new areas of research and education, participate in technical and career development projects and receive hands-on research experience that can help them transition into college and potentially participate in undergraduate research programs. The goal of the program is to provide the youth of rural [state] an opportunity to prepare for, participate and thereby guide them towards various career choices in the fields of agriculture, forestry, and natural resources.

How it works/methodology/program phases/steps

Constructive Objects of Agricultural Learning (COALs) were implemented to support and enhance holistic development of the students. [University] faculty volunteers were recruited to work with ninth and tenth grade students at [high school] on a research project or COAL in the spring of 2021. A COAL is a project-based learning outcome developed by a student in partnership with a faculty member that allows the student and faculty member to become active partners in the learning process. These COALs were directed by the high school science and agriculture teachers in partnership with the university faculty volunteers. The faculty volunteers zoomed with the students twice during the semester to introduce themselves and teach a mini lesson in their area of expertise. At the conclusion of the project, students developed and presented their COAL in poster format at a symposium attended by faculty from three universities. Due to the global pandemic, the symposium was held virtually. The symposium will be on campus at [university] in 2022.

COALs highlight cross curricular projects with problem-based learning through the introduction of the scientific method allowing students the opportunity to complete hands-on projects with a university faculty mentor. The research projects were completed in the ninth and tenth grade science and agriculture classes. Students developed the posters in their english class and analyzed data in their math class. The four teachers (science, agriculture, english and math) incorporated the COALs into their existing lesson plans to meet state teaching standards. Incorporating COALs into existing curriculum and state standards can enhance student led research in the secondary school system. COALs also provide experiential learning opportunities for students to work with university faculty thus integrating scientific research and agricultural practices into existing secondary curriculum.

Results to date/implications

In total, 31 ninth graders and 29 tenth graders worked in groups of four or five students. Four faculty members in horticulture, forestry, and entomology volunteered to work with students. Students began their guided research projects during the spring of 2021, but due to the COVID-19 pandemic some of the students had to quarantine and were unable to work on the projects consistently throughout the semester. As a result, one student presented alone, and multiple groups presented without the full group present.

The students worked on three different research projects in a hybrid and in-person setting to complete nine COALs posters. Students were successfully able to perform their research and complete their projects given certain restrictions due to COVID. Students completed projects related to the effects of biochar as a soil amendment in drought conditions, the effect of fertilizer on leaf characteristics, and how fertilizer affects tomato growth herbivory.

Future plans/advice to others

The COVID-19 pandemic delayed the progression of the program significantly. In the future students will visit [university], take a tour, and present their research during the annual symposium. The goal behind this plan is to expose students to an institution of higher education and that earning a college degree is obtainable. The [university] campus can seem overwhelming to a student from a small town, especially coming from a school with a graduating class of 30. Bringing them to campus on a yearly basis to present their COALs research projects familiarizes them with the campus and programs of study available to them making the main university campus seem a little less intimidating.

The second year of the COALs program will begin in September 2021 as opposed to January 2022. For many program participants, this was the first time they had ever conducted research and shared their findings in formal presentations. Going forward, the program plans to implement interpersonal development training focused on promoting growth mindsets, confidence, and mentorship that will help students identify and harness their inner strengths and communication skills. Training workshops related to public speaking and leadership development are projected to begin in late October or early November to help prepare students for the spring research symposium to improve their public speaking, communication and problem-solving skills.

The program also plans to expand the current curriculum beyond the scope of hard science into the realm of social sciences. This year, faculty were primarily recruited from the college of agriculture at [university]. In year two, a wider call for faculty volunteers will be distributed to additional colleges and schools within the university to allow for a broader range of research opportunities and experiences.

Costs/resources needed

This program is funded by a grant from the United States Department of Agriculture. As part of the grant, faculty mentors received $125 USD for each COAL poster developed, however a majority of the mentors donated their stipends towards the COAL projects.

References

U.S. Census Bureau. (n.d). *Quick facts*. Retrieved June 11, 2021, from https://www.census.gov/quickfacts/fact/table/[state]

[state] Higher Education Policy Commission (2018). *[state] college-going rates by county and high school*. https://www.[state].edu/wp-content/uploads/2019/04/CGR_2018_Final_PDF.pdf

Innovative Idea Poster

Online Asynchronous Microteaching in an Agricultural Education Teaching Methods Course

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Introduction

During the Fall 2020 semester, the format of course delivery and the semester schedule were both adjusted to mitigate the effects of COVID-19 on members of the Purdue University community. Courses were offered in a Hy-Flex format throughout the semester, allowing students to attend class face-to-face and virtually simultaneously. The university calendar eliminated the two-day October break, and ended face-to-face instruction after the Thanksgiving break so that the final week of classes were delivered virtually. During the Fall 2020 semester, there were 24 students enrolled in the Methods of Teaching Agricultural Education course at Purdue University. Of these 24 students, 15 were slated to complete their student teaching internship during the Spring 2021 semester. Given the constraints of teaching within a Hy-Flex format, and the environment that the majority of students would be student teaching in, the course instructor decided to integrate both face-to-face and online microteaching experiences into the course. Prior to the Fall 2020 delivery of the Teaching Methods course, all microteaching experiences were conducted face-to-face, and the majority of course content focused on facilitating learning in a face-to-face environment. The final microteaching experience of the Fall 2020 semester was adjusted to be an asynchronous, weeklong lesson that was taught the week after Thanksgiving break.

How it Works

Since many students experienced inconsistent access to high-speed internet after the Thanksgiving break, an asynchronous approach to instruction was deemed to be the most accessible for the majority of students. Across the semester, students explored various teaching technologies through a "Teaching Technology Tool Presentation" assignment in which they demonstrated how to use digital tools like Nearpod, EdPuzzle, Screencastify, and Peardeck. Many students integrated use of these tools into their face-to-face microteaching demonstrations to navigate socially distanced instruction, which helped them be better prepared to use the tools during their virtual microteaching. Course content was updated to include online instructional approaches including asynchronous and synchronous methods and best practices.

To prepare for the virtual microteaching experience itself, each lab section was divided into three smaller groups of three to five students. Students would only microteach their peers within their smaller lab groups. The course instructor provided a scenario prompt that outlined the type of technology typically available, student background knowledge and experiences, and the expectations of the administration in their "school." Teachers were encouraged to plan activities that their students could complete independently across the week, but also to plan for a 25 minute live synchronous session to check in with students. Groups were encouraged to meet for their live session if they had the technology resources to do so, but were not required to complete the synchronous session as part of their microteaching grade. As with the face-to-face microteaching sessions all semester, students were expected to provide written feedback for their "teacher" by Friday at 5 pm. When "teachers" submitted their reflections on how their asynchronous lesson went, they were also required to include the feedback forms from their peers so that their lab instructor could view them.

To prepare for the lesson, students wrote a lesson plan using the 5E instructional model instead of the individual class period template that had been used throughout the rest of the course. Drawing from suggestions from online learning experts (Tucker, 2020), the course instructor designed a new lesson plan template that included both a teacher outline and a student view. Building off of Tucker's (2020) suggestions, the teacher outline included how they would plan to move their students through the 5Es across the week, and the student view was written to provide directions to their student peers on how to move through the learning activities for the week. Teachers outlined what students would be doing and what digital tools they would be using to help students move through those learning activities, while on the student view, learning objectives, prompts, resources, and learning task directions were provided. The student view page was designed to be an interactive document in which teachers could hyperlink to digital tools and resources, making the page a HyperDoc (Highfill, Hilton, & Landis, 2016).

Teachers posted their asynchronous learning activities either to the course Learning Management System, or shared them vie email. Course instructors needed to be able to view these learning activities and the communication between the teacher and students to be able to accurately assess how the teachers interacted with their students. Microteaching rubrics were adjusted to reflect the new format and aligned with the 5E instructional model. Teachers also completed a reflection form at the end of their instructional experience that was updated to reflect the unique environment in which they taught asynchronously.

Results to Date/Implications

Most students identified communication with students as the most challenging part of teaching in this format, as it was difficult to know where they were in their progress through the lesson. Some students used technologies that showed reports of student progress through the learning activities, but others sent out links to recorded lectures and worksheets, not knowing if students had completed them. Unlike live or real-time teaching, asynchronous teaching does not always allow for the instructor to quickly receive in the moment formative assessment feedback from students. Future iterations of this activity may be adjusted from asynchronous to synchronous online instruction, or limit lesson length to one or two days instead of a whole week.

Future Plans/Advice to Others

Creating the materials and supporting resources for this learning experience took quite a bit of time, and logistical management of the activity was initially challenging to conceptualize. Students reported feeling frustrated that elements of the lesson plan template had changed from what they had previously experienced in the semester, so in the future, the course instructor may integrate the use of the 5Es instructional model as part of instructional plans earlier in the course or overall curriculum. The course instructor is currently planning for the Fall 2021 delivery of the course, and is considering how virtual instruction can be integrated into the course. Currently, Purdue University intends to be operating face-to-face, but considering that many schools across Indiana were using eLearning days prior to the COVID-19 pandemic, it is likely that many of our graduates will continue to teach in an asynchronous virtual format at some point.

Costs/Resources Needed

This teaching approach required considerable investment of instructor time to develop the supporting materials in advance. It would be helpful for each undergraduate student to have their own Google Classroom to manage from an instructor perspective instead of uploading documents to our university's LMS. Our institution is not a Google school, so the course instructor is looking into how this can be integrated into future coursework.

References

Highfill, L., Hilton, K., & Landis, S. (2016). *The HyperDoc handbook: Digital lesson design using Google Apps*. Elevate Books Edu.

Tucker, C. R. (2020, March 8). Tips for designing an online learning experience using the 5Es instructional model. *Dr. Catlin R. Tucker*. https://catlintucker.com/2020/03/designing-an-online-lesson/

Taking Tractor Safety to the Virtual Limit: A Pilot Study

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Taking Tractor Safety to the Virtual Limit: A Pilot Study

Introduction and Literature Review

During 2019, the agriculture, forestry, fishing, and hunting industry reported 573 fatal injuries and 167 fatalities resulted from contact with an object or equipment (U.S. DoL, 2020). During this same year, 84 youth ages 19 and below suffered fatal injuries while working in the United States. Statistics like these supports the need for farm safety and is an aspect of a large industry, like agriculture, that impacts everyone involved. Programs of multiple types have been developed to help train and educate students in safe tractor operation from traditional methods to more creative methods (Vincent et al., 2019, Koc et al., 2012).

Given the hazardous situations that can occur on machinery while working and during training, educators believe that Virtual Reality (VR) can be used as an alternative training tool (Kizil et al., 2001). VR can be an efficient tool for K-12, colleges, and universities to provide their students' knowledge and skill of complex mechanisms and theories (Lee, 2012). As VR proves to be a more effective method of training students than fully traditional methods (Stredney, Hittle, & Sessanna, 2008). The need for more realistic simulations creates the opportunity for us to incorporate VR as an alternate means of training students and workers. Currently VR is used as a training method in the Army, Air Force, surgical training, industrial safety training, and pedestrian safety training (Aggarwal et al., 2006).

Research Question and Objectives

The objective of this pilot study was to:

1. Describe the user experience (UX) of the students.

Methods

The population that was used for the pilot study was comprised of students that were enrolled in an Ag Safety and Health and Machinery Maintenance course at The Ohio State University. Students were solicited from those classes to participate in the pilot study (Creswell et al., 2018). The sample size of students was *n* = 11, due to COVID restrictions and the end of classes turnout was low. The students could only participate in the survey once they had completed virtual reality program.

The virtual reality program utilized for this study is a product of an objective from a Safety in Agriculture for Youth (SAY) grant funded by USDA NIFA. The program was developed from the National Safe Tractor and Machinery Operation Program (NSTMOP) driving and skill course. In the virtual environment, participants are required to complete pre-op checks on a tractor and drive the tractor through a course modeled after the NSTMOP certification course. The program was developed as a supplemental resource for the live offering of the course so that students can practice while someone else is on the machine, while at home or at a distance, accommodate social distancing and COVID requirements. The program operates on the Oculus Quest/Quest 2 VR headsets.

The VR experience consists of three different areas, the first area consists of a stationary tractor that allows students to move around it and interact with different points of interest related to safety. The second area is a driving course where students have to answer questions related to preoperational checks related to machinery operation. They can then mount and drive the tractor through an obstacle course that resembles the course they will drive during certification, once completed they get a scorecard detailing their progress. The last area is the skills test, this allows students to interact with hitching an implement, attaching a PTO and hydraulic connections. The students data can be saved within the headset to be accessed on the teachers computer for grading.

Results

The pilot study concluded with useable data from 9 students. Means for all the constructs can be seen below in Table 1.

Table 1

Descriptive Statistics of Students' User Experience (UX)

Construct	Mean
Presence	6.8
Engagement	7.5
Immersion	6.2
Flow	6.3
Usability	7.1
Emotion	5
Skill	7.1
Judgement	7.6
Experience Consequence	2.2
User Experience	6.2

The data represented here indicates that users had a moderately positive user experience from the VR program. The results of this pilot study did identify a bug that prevented students from driving the tractor very far, so students completed as much as they could inside the program before completing the survey. The bug was rectified, and the experience was tested with a group of 11 new students again with no issues.

Future Plans

This was a pilot study, to determine base of usability of this experience and to determine if there were any problems with students using the experience. A large scale pilot study is being planned for 2021-22. Future plans for this experience include adding different types of equipment and more skill related to machinery operation.

Costs/Resources

Currently the VR experience is going through the approval process through university branding and marketing departments. The program will then be available for download through the SideQuest online store or through the developers website. The only thing needed for the experience is a Quest or Quest 2 VR headset, which run from $299-$400 depending on the store space purchased.

References

Aggarwal, R., Black, S. A., Hance, J. R., Darzi, A., & Cheshire, N. W. (2006). Virtual Reality Simulation Training Can Improve Inexperienced Surgeons Endovascular Skills. *European Journal of Vascular Endovascular Surgery*, 588-593.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.

Hard, D. L., & Myers, J. R. (2006). Fatal Work-Related Injuries in the Agriculture Production Sector Among Youth in the United States, 1992-2002. *Journal of Agromedicine*, 57-65.

Kizil, M. S., & Joy, J. (2001). What can virtual reality do for safety. *University of Queensland, St. Lucia QLD*.

Koc, A. B., Liu, B., & Langley, G. C. (2012). Teaching Tractor Roll-over Stability Using L ego Mindstorms. *2012 ASABE Annual International Meeting.* Dallas.

Lee, K. (2012). Augmented reality in education and training. *TechTrends*, *56*(2), 13-21.

Stredney, D., Hittle, B., & Sessanna, D. (2008). Evaluating Elicted Anxiety in a Simulated Environment. *Studies in Health Technology and Informatics*.

Vincent, S. K., Mazur, J. M., Summey, T. E., & Bryd, A. P. (2019). An Evaluation of Behavioral Intent in Appalachian Youth Participating in a CROPS Curriculum. *Journal of Agricultural Safety and Health*, 25-36.

Teaching Creatively with Authentic Inquiry Cohorts Due to COVID-19 Disruptions

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Introduction

In the spring of 2020, post-secondary institutions around the world abruptly shuttered the typical face-to-face teaching and learning environment in favor of remote instruction (Rapanta et al., 2020). The abrupt change to fully remote learning in response to the COVID-19 pandemic required faculty to quickly learn new pedagogy, reformat course structures, and implement needed flexibility in their courses (Mishra et al. 2020). During the following summer, school administrators would again evaluate whether instruction would remain virtual or if students would be allowed to return back to campus, and if so, the extent of face-to-face instruction allowed. These difficult decisions had to account for a teaching and learning environment that was both safe and effective. At Doane University, located in Crete, Nebraska, the decision was made to allow students to return to the small residential campus. Administrators, regional health experts, faculty, and other stakeholders worked tirelessly to develop an ultimately successful plan that would allow in-person classes to resume. The plan included high levels of precautionary measures such as implementing required social distancing, face-masks, mandatory quarantines, contact tracing, and small maximum class sizes, among other safety measures. Given COVID-19 restrictions, and the university's unwavering support for faculty to be highly innovative, personal, and unique in their teaching, the course structure and teaching practice of the course *Local and Global Food Systems* was dramatically changed to include authentic research conducted by student cohorts. This innovative poster will describe the changes in the course, resulting outcomes, and plans for future course modifications. Examples of innovative and unique teaching strategies, especially ones employed under unique parameters, can be useful case studies in the profession.

How it Worked

Local and Global Food Systems was a relatively new undergraduate course at Doane University with an aim to be an exploratory course on food production for agriculture majors and non-majors. In the fall of 2020, 17 students were enrolled in *Local and Global Food Systems*. The 3-credit course was scheduled to meet Mondays, Wednesdays, and Fridays, for one-hour. However, due to COVID-19 restrictions, the maximum student capacity was breeched. In addition, administration suggested to maximize hybrid modalities and to only use small in-person gatherings. Therefore, the 17 students were split into three cohorts, and each cohort met once in-person each week and also were given assignments to be completed asynchronously throughout the remainder of the week. The arrangements of three cohorts allowed each cohort to include 5 or 6 students and easily fostered a learning community characterized by in-depth conversations, faculty guidance, and intensive student-student and faculty-student interactions. Given the small cohort-size and ability of the faculty to guide the small student groups, the course content was adapted to incorporate a semester-long, authentic inquiry project involving food production. Each of the three cohorts completed their own identified authentic inquiry research project involving some aspect of the local and global food system. Although this project was a large part of the total class, other course requirements reflected the traditional course material and learning objectives. For each cohort's authentic inquiry research project, the cohort first selected a current topic of investigation that met a community or regional need involving the local food system. Each cohort then narrowed down their topic to include specific research objectives or questions. The faculty member, who had an expertise in social science research, then guided each cohort to develop appropriate research methods to collect and analyze data. Seven assignments were created, including rubrics, that guided each stage of the cohort's research project: component 1: topic selection, purpose statement, objectives/questions;

component 2: annotated bibliography; component 3: introduction, literature review, and framework; component 4: research methods; component 5: data collection; component 6: results; and component 7: dissemination. For the total project summary, due at the end of the semester, each cohort developed a short, written manuscript and presented their results to the other cohorts through a live virtual presentation.

Results

The restructuring of the course into three student groups allowed the faculty member a very high degree of faculty-student interaction with small student cohorts. This established a strong learning community (West & Williams, 2017) within each cohort. A disadvantage was each cohort met in-person for only 1-hour each week, and serious time constraints occurred to both cover course topics and for each cohort to be guided on their authentic inquiry projects. None-the-less, each cohort was successful in conducting authentic inquiry research projects. One cohort conducted a qualitative analysis on the impact of COVID-19 on small-scale swine producers in the Midwest. They were effective in designing a semi-structured interview, obtaining IRB approval, interviewing swine producers via phone, completing a rough coding exercise, and summarizing and presenting their results. Another cohort was able to complete a qualitative study on conventional row crop farmers' perceptions and attitudes toward industrial hemp. They were also able to construct an interview guide, obtain IRB approval, interview farmers via phone, code data, analyze results, and present findings. The third cohort chose to investigate the demand for locally-grown hops from small-scale breweries in the Midwest. They were able to develop a research-caliber survey and a full sampling frame, however, the group ran out of time to conduct the research. Each cohort presented an excellent overview of their study. Overall, students enjoyed completing an authentic inquiry project with their cohorts. On course evaluations, one student remarked about the course structure being beneficial, "the class was structured differently than the other classes that I have had and I thought it worked well for the current situation with COVID." Several students also described the cohort-based inquiry project. One student said the research project, "made [him] see a whole different side of farming," and another student remarked, "I like that it was hands-on in conducting research and being able to see the results." Several students also mentioned they enjoyed investigating "real life scenarios." Despite a majority of comments being positive, a couple of students did mention the time constraints and high workload required of the cohort projects.

Costs and Resources

The fiscal costs associated with the cohort inquiry projects were very low. For students conducting interviews, students used zoom to record and transcribe phone interviews. The university's IRB board was also used to obtain research approval. The research participants themselves were also vital resource, as well as the faculty's guidance on research methods.

Future Plans

It is anticipated that the semester-long, authentic inquiry research projects will become a permanent component in the *Local and Global Food Systems* course. However, modifications to the project and course structure will be made. Due to issues with time, and post-COVID when typical in-person class sizes can resume, all students will likely meet three times each week at the same time as opposed to once each week with their cohort. Cohorts will be transitions to permanent teams (Zapata et al., 2017). Research guidelines will also be established that require the same methodology by each group – short, semi-structured interviews worked well. Additional, "lessons learned" from this experience will be presented in the poster format.

References

Mishra, L., Gupta, T., & Shree, A. (2020). Online teaching-learning in higher education during lockdown period of COVID-19 pandemic. *International Journal of Education Research Open*, 100012. https://doi.org/10.1016/j.ijedro.2020.100012

Rapanta, C., Botturi, L., Goodyear, P., Guardia, L., & Koole, M. (2020). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education, 2*, 923-945. https://doi.org/10.1007/s42438-020-00155-y

West, R. E., & Williams, G. S. (2017). I don't think that word means what you think it means": A proposed framework for defining learning communities. *Education Tech Research Dev, 65*, 1569-1582. https://doi.org/10.1007/s11423-017-9535-0

Zapata, F., Kosheleva, O. & Kreinovich, V. (2017). Are permanent or temporary teams more efficient: A possible explanation of the empirical data. *Journal of Innovative Technology and Education, 4*(1), 113-116. http://digitalcommons.utep.edu/cs_techrep/1143

Innovative Poster

Teaching Identity & Inclusion in Agricultural Education for General Education Credits

Introduction/need for innovative idea

This new course offers students the opportunity to engage in the Learning Core Outcomes for Discourse and Critical Analysis of Identity and Equality in the United States as a part of the Pathways to General Education in the context of agricultural and life sciences. Given the history of the agriculture industry in the United States, future employees will benefit from the opportunity to examine the fundamental concepts of the human experience of the diverse people engaged in agricultural and life sciences. The critical analysis of identity and equity in agriculture and life sciences provides an ideal context in which students will have the opportunity to learn and apply critical thinking skills and dispositions.

Students examine artifacts and histories of the multiple individuals and cultures integral to the evolution of the U.S. agricultural and life sciences. Utilizing principles of discourse, students have an opportunity to apply new knowledge and perspectives to address current and emerging issues that must be recognized and addressed to include diverse populations for the agricultural and life science industry. Hands-on opportunities come with experiences with cultures and individuals unfamiliar to them as part of the course assignments. Minds-on approaches emphasize intellectual engagement in analyzing historical narratives and figures from different cultures represented in the history of American agriculture and life sciences.

How it works/methodology/program phases/steps

As a sophomore-level course, students are encouraged to enroll and encounter this curriculum early in their collegiate careers. The course is intended to serve as an applied Discourse course that builds on the material students learn and practice in first-year English courses. This course is taught using a flipped-classroom format to allow students to engage in the weekly material prior to the classroom sessions. Class sessions are taught using small group discussions, student facilitated presentations of topics, and cooperative learning activities, to ensure students have the opportunity to engage with the curriculum in authentic ways to resonate with their different learning styles. Assignments will allow students options to bring their creativity, personal histories, and individual ideas to their work.

As illustrated in Table 1, topics include the historical evolution of U.S. agriculture and life sciences, participation and power of the groups engaged in U.S. agriculture and life sciences, the social influence on identity development, and historical inequity in U.S. agricultural and life sciences, with the application of competencies in discourse including the ability to reason, write, and speak effectively. Multiple concepts are integrated into each assignment: weekly reflections based on guided prompts, highlight oral reflections synthesizing critical aspects of a group of weekly written reflections, a project (visual arts, poems, or another creative outlet) that provides an opportunity to create a personal perspective of inclusion efforts in the industries of agriculture and life sciences, and the final paper in which students will develop a set of strategies to be more inclusive of others in a particular sector of the industry.

Table 1: Syllabus Topics

Identity and diversity of people engaged in agricultural and life sciences
Impacts of social power and equity on the lived experiences of persons engaged in the industries of agriculture and life sciences
Examine texts, artifacts, and lived experiences of people within agricultural and life sciences to learn different perspectives
Individual knowledge of and experiences with different cultures
Interactive relationships between people engaged in agricultural and life sciences
Research, analyze, and discuss critical issues of diversity within agriculture and life sciences
Develop strategies for greater inclusivity in a sector of the agriculture and life sciences

Results to date/implications

Overall, this course is well-received by the undergraduate students, receiving strong overall ratings on the Student Perceptions of Teaching (SPOT) evaluations as a general education course (Table 2). As student enrollment numbers increase, the department will consider increasing the number of sections offered each semester. The course is designed to have a maximum capacity of forty students per section to support student-centered teaching practices.

Table 2: Student Perceptions of Teaching

Term	Students Respond/Enrolled	Overall Rating	Dept Avg	CALS Avg
SP 21	24/38	5.26	5.41	5.24
SP 20	19/32	5.16	5.39	5.36
FL 19	12/19	5.83	5.22	5.28
SP 19	22/36	5.0	5.21	5.34

Future plans/advice to others

As we begin offering multiple sections of the course each semester, we plan to develop a teaching structure to support two GTAs. The intention is that one GTA will start working with the program, and the next year, another GTA will be added. The second-year GTA will become the instructor of record for one of the sections. This structure will allow our program to support graduate students seeking experience teaching equity, inclusion, and diversity in CALs.

We advise others interested in teaching this content to consider the texts listed in the references.

Costs/resources needed

The course was proposed and approved with the understanding that there would be no additional costs to the department. Preparation to teach the course involves a significant amount of time and commitment by the instructor to learn the content at a depth to teach the course with substance, accurate vocabulary, and a strong familiarity with the complexities of the history of the U.S. agricultural industry.

References

Carney, J. A. & Rosomoff, R. N. (2009). *In the Shadow of Slavery: Africa's' Botanical Legacy in the Atlantic World*. Los Angeles, CA: University of California Press. 186 p.

Cohlene, T., Reasoner, C., Warren, V. (2003). *Dancing Drum: A Cherokee legend*. Watermill Press. Vero Beach, FL. 27 p.

Holmes, S. M. (2013). *Fresh Fruit, Broken Bodies: Migrant Farmworkers in the United States*. Los Angeles, CA: University of California Press. 198 p.

Livermore, D.A. (2013). *Expand your boarders: Discover ten cultural clusters*. East Lansing, MI:
Cultural Intelligence Center, LLC. 94 p.

Metzger, M. J. & Flanagin, A. J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics*, 59 (Part B), 210 220.

The Cultural Intelligence Center (2017). *Cultural Intelligence Self-Assessment*. Holt, MI: The Cultural Intelligence Center. Retrieved from https://culturalq.com/products services/assessments/cq-assessments/

Weisiger, M. (2011). *Dreaming of Sheep in Navajo Country*. Seattle, WA: University of Washington Press.

The Climate Change Curriculum Challenge: ***Crowdsourcing novel topics in climate change science education from current secondary educators.***

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Introduction

Climate Change has been called by some the most significant challenge facing civilization in the 21st century with the agriculture industry playing a central role, yet how will we engage the problem solvers of tomorrow? The United States Department of Agriculture reported climate change is likely to diminish continued progress on global food security through production disruptions that lead to local availability limitations and price increases, interrupted transport conduits, and diminished food safety, among other causes (Brown et al, 2015). Some studies have suggested beginning with children to reverse the change in attitudes towards climate change education, and while children tend to be more receptive to climate change messages than adults (Valdez et al., 2018), educating young Americans will take a concerted effort on the parts of the agriculture industry, elementary, middle and high school education systems as well as the systems of higher education that oversee teacher training (Burrows et al., 2020). Supporting awareness of local and global political and ecological issues will help students realize how to fix problems and implement sustainable measures (Wenger, 1998). Before students can explore plausible routes to mitigate the risk of climate change, they must be taught the strategies needed to solve climate change science problems and the scope of climate change science by educators who have a level of concern on the topic and who possess the tools to deliver progressive inquiry-based curriculum. Bella & Dyer (2009) however, found that teachers who had been introduced to a curriculum, but had not received training in this innovation, expressed lower in their stages of concern, but also found that teachers who had experience with the curriculum ranked higher in their stages of concern. The Climate Change Curriculum Challenge was implemented to extend the professional development experience for participants in the Climate Literacy for Agriculture and Sustainable Societies (CLASS) conference and empower educators to both build curriculum resources and receive coaching to utilize novel curriculum resources to prepare students to address issues in climate change science. The University of Tennessee Martin in partnership with the Global Teach Ag Network at Penn State University launched the CLASS initiative. Funded by a grant through the United States Department of Agriculture, both content presented during CLASS as well as the Climate Change Curriculum Challenge are tied to UN Sustainable Development Goal #13: Climate Action (Desa, 2016).

How it works

The goal of the Climate Change Curriculum Challenge was to use a crowd-sourcing method for building a library of educator resources on the topic of climate change science education. Participants in the CLASS conference worked in groups of five to complete the challenge. The Climate Change Curriculum Challenge was comprised of two parts (1) the pitch and (2) the product. The pitch was in a lightning-style presentation where participants were tasked with composing a two-minute presentation to a panel of judges with the intent of discussing what each group would choose as the theme and composition of their final curriculum product with the judging panel providing feedback for each group going forward. The pitch guidelines included three distinct elements: (A) sharing the topic, (B) making a local connection to climate change science, and (C). each member of the group detailing activities for the curriculum package.

The product included three elements as well: (A) a lesson plan, (B) a lab activity, and (C) a summative assessment. Length of the curriculum was guided by a need for a week-long immersion into a topic that any educator wishing to discuss climate change science could pick up and integrate in their classroom. Completed curriculum resources were turned in through a portal on the University of Tennessee Martin website and reviewed by the judges for feedback. The final packages were compiled and uploaded to the University of Tennessee website for use by any educator wishing to take advantage of the library of content built by the crowd-sourced packages.

Results to Date

Participants in the Climate Change Curriculum Challenge (N=16) began their experience by first attending the CLASS conference where climate change science experts shared perspectives and dialogue on where the state of climate change science education is and where educators at the secondary level fit into the role of advancing climate change science education. Participants were then tasked with selecting the topic for the challenge of the pitch and the product. Topics from the teams included: water management, food systems, and clothing manufacturing. These presentations were reviewed by the judges for appropriateness and potential for use by fellow educators. Ten days post-conference, each team submitted a final curriculum resource (the product) that had both a unique connection to local context, but also a global connection as well that provided avenues for further study beyond US borders.

Future Plans

Given the success of the first iteration of the challenge, a similar program will potentially be used at a 2022 national event where teams of educators will be formed by region, and the topics will fall under the umbrella of food security, dependent upon acquisition of external funding. The team believes that the homophily found in the regional context is vital for relevance of the content and educator interest. Future research will focus on investigating educator motivation for participation in activities that use topics of regional significance but also connect to key global issues like climate change and food security. There is a need for enhanced climate change education (Boyko et al., 2021) that also connects with the global systems that interact with food, fiber, and natural resources. The challenge presents two significant opportunities for the agricultural education profession, (1) evidence for potential of building an open access library of resources from educators with diverse perspectives in climate science and agriculture, and (2) increasing the relevance of regional issues for motivating engagement in global issues.

Resources Needed

Items	Notes/Description	Unit Cost	Qty.	Total
Judging Honorarium	Honorarium for each of the 2 reviewers of the presentations and curriculum packages.	**$100**	**2**	**$200**
Event Completion Incentive	A complimentary digital registration to a future professional learning event	**$25**	**16**	**$400**
Platform for Online Conference	Appropriate Learning Management System for on-demand and live collaboration	**$2000**	**1**	**$2000**
			Total	**$2600**

References

Bella, B. A. & Dyer, J. E. (2009). Attitudes and stages of concern of elementary teachers toward agriculture as a context for teaching across grade level content area standards. Journal of Agricultural Education, 47(4), 12-26. https://doi-org.ezaccess.libraries.psu.edu/10.5032/jae.2009.02012

Boyko, M., Desak, T., Fleming, C., Diplock, K., & Pons, W. (2021). Climate change education: the need for comprehensive climate change education in environmental public health curriculum. Environmental Health Review, 63(4), 114-120.

Brown, M.E., J.M. Antle, P. Backlund, E.R. Carr, W.E. Easterling, M.K. Walsh, C. Ammann, W. Attavanich, C.B. Barrett, M.F. Bellemare, V. Dancheck, C. Funk, K. Grace, J.S.I. Ingram, H. Jiang, H. Maletta, T. Mata, A. Murray, M. Ngugi, D. Ojima, B. O'Neill, and C. Tebaldi.(2015). *Climate Change, Global Food Security, and the U.S. Food System.* Available online at http://www.usda.gov/oce/climate_change/FoodSecurity2015Assessment/FullAssessment.pdf. DOI: 10.7930/J0862DC7

Burrows, M., Sorensen, T., & Spielmaker, D. (2020). Assessing the Acceptance of Incorporating Agriculture into Elementary School Curriculum. *Journal of Agricultural Education*, *61*(2), 358-370.

Desa, U. N. (2016). Transforming our world: The 2030 agenda for sustainable development. United Nations. https://stg-wedocs.unep.org/bitstream/handle/20.500.11822/11125/unepswiosm1inf7sdg.pdf?sequence=1

Valdez, R. X., Peterson, M. N., & Stevenson, K. T. (2018). How communication with teachers, family and friends contributes to predicting climate change behavior among adolescents. *Environmental Conservation*, *45*(2), 183-191.

Wenger, E. (1998). Communities of practice: Learning as a social system. Systems thinker, 9(5), 2-3.

Innovative Poster

Using Implicit Bias Education in an Undergraduate Course to Enhance Student Development and Achieve Course Objectives

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Using Implicit Bias Education in an Undergraduate Course to Enhance Student Development and Achieve Course Objectives

Introduction

While explicit biases or overt prejudices toward others lead to negative behaviors and discrimination, implicit biases can lead to equally negative discriminatory practices such as inequitable teaching behaviors, biased job hires, racial differences in school discipline, and stereotyping (Banaji & Greenwald, 2013; Devine, et al., 2014). Implicit bias occurs based on preferences about race, gender, sexuality, age, and many other human characteristics. Implicit biases are cognitive processes that affect our attitudes toward others resulting in positive or negative viewpoints impacting our decisions, perceptions, and behaviors (Kirwan Institute for the Study of Race and Ethnicity, 2018; Project Implicit, n.d.).

Internalized associations often start at a young age that may foster biases toward groups of people based on what we see in the media, our background, and experiences (Kirwan Institute for the Study of Race and Ethnicity, 2018). Unfortunately, implicit bias can turn even our best intentions into unwanted outcomes. Therefore, is it important for educators, communicators, and leaders to be aware of our own biases (hidden and obvious). The good news is that this awareness can help prevent inequitable interactions and practices (Banaji & Greenwald, 2013; Devine, et al., 2012).

The purpose of this innovative poster is to share how implicit bias education, as part of an undergraduate course (i.e., program development and evaluation), promotes student development and achieving course outcomes. Similar strategies can be used in other agricultural education, extension, communication, and leadership courses.

How It Works

Students in the course complete a graded assignment, Implicit Bias Module Series, through the Kirwan Institute for the Study of Race and Ethnicity (2018). The assignment consists of four online learning modules, 1) Understanding Implicit Bias, 2) Real-World Implications, 3) Understanding Your Own Biases, and 4) Mitigating Unwanted Biases. The third module directs students to take the Implicit Association Test (IAT) through Project Implicit (n.d.). There are 14 IATs offered through Project Implicit, in areas such as race (Black – White IAT), sexuality (gay – straight IAT), and age (young – old IAT). Students are required to take the race IAT and select another one of their choice. The IAT has been studied extensively to establish instrument reliability and validity with over 150 peer-reviewed publications utilizing the IAT (Project Implicit, n.d.).

For the course assignment, students complete four online quizzes (multiple choice) with each of the learning modules and save their results in a PDF file to then submit into Canvas (i.e., web-based learning management system). Full credit is given for quiz completion (i.e., not percent correct) to enhance the learning experience rather than earning a score or grade. Explanations are provided for incorrect answers to help student growth and learning. Students must also submit to Canvas their responses to three self-reflection questions. The self-reflection questions are related to taking the race IAT and the other IAT selected. Students do not submit their IAT results since it is for their own reflection and not for me (instructor) to point out or cast judgement about their biases.

Self-reflection questions support both student professional development and course objectives:

1. Which two implicit association tests did you complete and what were your feelings or reactions? [professional development]

2. Reflect on your life experiences that may influence your implicit biases; family, growing up, neighborhood, media, etc. How might these experiences shape your thoughts and biases, with or without conscious awareness? [professional development]

3. How might knowing your implicit biases help outreach educators (professionals, volunteers, etc.) deliver effective programs. [course objectives].

Results to Date - Implications

The results from student input and completion of course assignments indicate student professional growth and achieving course objectives to develop and implement effective outreach education programs. While these results were positive, it is important to note that several students were surprised about their IAT results. To help students process, data was shared about the race IAT in which over 70% of respondents (based on millions of people who have completed the race IAT) prefer White (European people) as compared to Black (African American people). Students also process common reactions of disbelief, disregard, acceptance, discomfort, and distress (Clark & Zygmunt, 2014) to help them make sense of their IAT results along with strategies for moving forward (Kirwan Institute for the Study of Race and Ethnicity, n.d.).

For my course on program development and evaluation, a key objective is to develop effective outreach education programs. A common error for students and outreach educators is to view characteristics of program participants as all the same, while also assuming program participant characteristics and learning function like them or those who implement programs. Implicit bias education (IBE) can address these misperceptions and create awareness for strategies to reduce bias. Unwanted biases can change through education and training, interaction-work with others who are different than ourselves, and self-reflection (Kirwan Institute for the Study of Race and Ethnicity, 2018).

Future Plans

I will use IBE again in this undergraduate course and consider how to incorporate into my other courses. Changes for using IBE include targeted feedback from students about completing IATs and the Implicit Bias Module Series. In addition, I plan to incorporate more IBE content into course exams and their final written assignment to develop an outreach education program and evaluation plan.

Resources – Costs

Resources to incorporate IBE into your courses are available without charge through the Kirwan Institute for the Study of Race and Ethnicity (2018) and Project Implicit (n.d.) which administers and provides results for numerous implicit association tests.

References

Banaji, M. R., & Greenwald, A. G. (2013). *Blindspot: Hidden biases of good people.* Delacorte.

Clark, P., & Zygmunt E. (2014). A close encounter with personal bias: Pedagogical implications for teacher education. *The Journal of Negro Education, 83*(2), 147-161.

Devine, P. G., Forscher, P. S., Austin, A. J., & Cox, W. T. L. (2012). Long-term reduction in implicit bias: A prejudice habit-breaking intervention. *Journal of Experimental Social Psychology, 48,* 1267-1278.

Kirwan Institute for the Study of Race and Ethnicity (2018). *Implicit Module Series.* http://kirwaninstitute.osu.edu/implicit-bias-training/

Kirwan Institute for the Study of Race and Ethnicity (n.d.). *Making Sense of Your IAT Results.* http://kirwaninstitute.osu.edu/implicit-bias-training/resources/iat-results.pdf

Project Implicit (n.d.). *Implicit Association Tests.* https://implicit.harvard.edu/implicit/