

Using Design Thinking to Solve Real-World Problems: A Pedagogical Approach to Encourage Student Growth

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Abstract. Providing students with opportunities to wrestle with and engage with messy, real-world problems can be challenging in traditional, higher education courses. However, for students in helping and applied professions, engaging with challenging problems in a supportive environment is critical to developing their skills and confidence. This paper presents an innovative pedagogical pilot project that utilizes design thinking in the context of a community-engaged applied learning experience to guide students as they worked on a real problem for real organizations. Undergraduate sociology and master's level social work students engaged in the experience during their regular course work. Their instructors coached them through the process. At the conclusion of the project, they reflected on the process and what they learned. These student reflection papers were analyzed using both a deductive and inductive approach. We found three themes present in these reflection papers: skill development, deeper understanding, and meaningful experience. We conclude our paper by describing how instructors can incorporate aspects of this project into their own classrooms.

Keywords: Design thinking; team-based learning; community engagement.

Students in social sciences and helping professions grapple with “wicked” or complex social problems in the classroom and as professionals. These challenges are so named as they are often messy with a lack of clear boundaries, have many stakeholders and systems involved, and may be both the cause and symptom of other problems (McCune et al., 2021). Wicked problems include poverty, food insecurity, homelessness, and housing insecurity, and many more. Use of case studies or other, more traditional problem-based approaches are useful in promoting active learning and encouraging students to apply course knowledge to real-world examples. However, these approaches may not help students fully engage with the dynamics and complexities of the problems they are likely to encounter as professionals, as instructors often frame the initial problem and lead students through a more linear problem-solving process (Melles et al., 2015). Design thinking offers educators across disciplines a novel way to teach students complex problem-solving skills while also allowing the students to actively, socially construct and develop knowledge and insights together. The applicability and usefulness for enhancing student learning and equipping students with experience in wrestling with messy problems offers insight into why design thinking has spread beyond its original home in the engineering and business fields (McCune et al., 2021; Moser et al., 2023; Pande & Bharathi, 2020; Panke, 2019; Razzouk & Shute, 2012; Salmon & Steinburg, 2008).

To help us facilitate a meaningful, real-world learning experience in our courses, we utilized an instructional model developed by an educational non-profit. The model uses design thinking as a framework and builds in a focus on student team development and partnerships with real world organizations. While there are a wide variety of implementation approaches and expected learning outcomes associated with using design thinking in educational settings (Panke, 2019), we were excited by this approach due to its potential to help us provide a learning opportunity that would allow us to guide students in the problem-solving process as they wrestled with messy problems that do not have a right or wrong answer, practiced taking a learner's stance within a team and with a real organization, and developed real, meaningful solutions that meet the needs of an organization. In particular, we hoped that this model would accomplish our student learning outcomes (described in more detail later), which centered on applying course content to real-world problems and learning how to work more effectively in teams.

To help us understand students' experiences and the potential value of this approach, we analyzed data from student reflection assignments in which they reflected on the impact of the experience on their educational and personal development. While there were challenges, our implementation of the model and our analysis of students' reflections on their participation suggest that this was a valuable and rewarding experience for students in many ways. We conclude by emphasizing the importance of these real-world experiences for student learning, and describing lessons learned and recommendations for others who may want to apply this method in their classes.

Background

The Design Thinking process, also referred to as human-centered design, is a framework to guide individuals and teams in creative problem-solving. While there are different definitions and approaches to design thinking and the design process (Panke, 2019), the approach developed by the Stanford D. School (2010) guided the model that we used in our classes. In this approach, the process is broken down into five steps: Empathize, Define, Ideate, Prototype, and Test. While the steps are presented linearly, teams are taught and encouraged to use the steps as guidelines, as design thinking is often an iterative process with adjustments made for new ideas and information (Noweski et al., 2012). There are also several mindsets or characteristics of a design thinker that are associated with the process including, empathy, resilience, creativity, and an appreciation for teamwork (Panke, 2019; Razzouk & Shute, 2012).

Design Thinking is a useful framework for helping students wrestle with messy or wicked problems for several reasons (Pande & Bharathi, 2020; Panke, 2019). First, design thinking aligns well with constructivist learning theory as it provides a useful framework for centering students as co-creators of knowledge and helping them interpret the knowledge together. Indeed, in a study drawing on constructivist learning tenets and a design thinking project for MBA students, Pande and Bharathi (2020) mapped constructivist tenets with the phases of the design thinking process and identified key areas of alignment. For example, they identified that the first

stage, empathize, allows aligns well with several constructivist tenets such as optimizing own knowledge, authentic tasks, and experiential learning. Similarly, the final stage, test, also overlaps with many tenants of constructivist learning such as social interaction, experiential learning, personal relevance, and adaptive cognition.

Additionally, compared to more traditional problem-based learning approaches, design thinking does not include a fixed or defined problem for students to solve (Melles et al., 2015; Panke, 2019). Rather, the design thinking process encourages teams to co-define the problem after learning from and about the person or group for which they are designing. This allows students to consider unique factors and resources that are relevant to their particular problem or group for which they are designing. This also allows students to synthesize and adjust their definition of the problem as they learn more information and dig into the root causes of the problem (Melles et al., 2015; Panke, 2019; Razzouk & Shute, 2012).

Second, the human-centered approach and focus on empathy, or the ability to understand and connect with the experiences and feelings of others, as the first step of the design process encourages students to take a learner's stance and try to better understand the needs and motivations of the people who experience the problem how others experience the problem (Dam & Siang, 2021; Henriksen et al., 2017; Kim et al., 2022; Panke, 2019). Indeed, as noted in Henriksen and colleagues' (2017) study on implementing a course with design as a practice and process for master's level education students, students often assume that they are empathetic and know how to empathize. However, the design process and intentionality of the empathize stage can help students better identify when they are making assumptions. For students who have not had first-hand experience with the wicked problem, this is an important way to reduce potential biases and assumptions (Panke, 2019).

Third, the applied nature of design thinking can help students enhance their teamwork and communication skills. The success of a design project largely has to do with how well teams communicate and address conflict (Panke, 2019; Razzouk & Shute, 2012). While this is true of any small group project, team processes as well as outcomes are central to the design process (Panke, 2019; Razzouk & Shute, 2012). Indeed, teams are reliant on each other at every stage of the design process as they work to narrow down their ideas in both the define and ideate stage. Having multiple points where teams have to learn from each other and make decisions together provides many opportunities for students to practice active listening, compromising, and conflict management skills (Kim et al., 2022; Panke, 2019).

Fourth, the opportunity for students to create and test their solutions provides opportunities to develop resilience and creative confidence (Micheli et al., 2018; Panke, 2019). For students who prefer educational activities with clear steps and answers, design thinking provides an opportunity for them to become more comfortable with uncertainty and exploring possibilities. The design process allows students to take risks and test ideas with each other. These opportunities can help

students become more resilient and flexible in their thinking (Panke, 2019). In addition, sharing ideas and creating something can be an exciting experience that helps students develop confidence in their ability to creatively solve problems and make a real impact (Henriksen et al., 2017; Panke, 2019).

While there are many benefits to incorporating design thinking into higher education courses, there are some additional considerations for successful implementation. Key to a successful design thinking project is the ability of teams to work well and leverage their individual strengths. Teamwork is always challenging and despite emphasis on processes, groupthink and unequal commitment can occur (Panke, 2019). This may be due to students' lack of understanding of how to collaborate and work effectively in teams. Implementation of key ideas from Edmondson's (1999) psychological safety framework and best practices in small group work, such as team contracts can help students develop and maintain stronger teams (Chang & Brickman, 2018). Psychological safety focuses on the culture and climate within teams and organizations with an emphasis on creating an environment where creativity and risk-taking is encouraged and members feel safe to offer critiques and ideas (Edmondson & Bransby, 2023). Hence, in a design thinking project attention to the processes and functioning of the teams is just as important as the outcomes or projects the teams produce.

Additionally, design thinking models do not always specify engagement with the community as part of the process. While design thinking projects are often connected with outside partners, it is not a requirement. Working with a community partner can benefit students in many ways. Community engagement is considered a High Impact Practice (HIP) which includes key components such as requiring interaction among faculty and peers, requiring frequent feedback, and providing for a public demonstration of competence (Abderhalden et al., 2016; Cotten & Thompson, 2017). Students involved in HIPs experiences increase their communication skills, ability to relate course material to the real world, and are more likely to complete their courses (Abderhalden et al., 2016; Bonet & Walters, 2016; Cotten & Thompson, 2017; Johnson & Snyder, 2020; Love & MacIlroy, 2021). Drawing on the constructivist framework once more (see Pande & Bharathi, 2020); for applied fields, working with and for a community partner can deepen the learning experience and relevance of the project for students.

As design thinking is a relatively new approach for many disciplines, it may not connect directly with the course materials, which can hinder implementation in a variety of courses. In the model that we have proposed here, design thinking can be adapted to a variety of disciplines with different learning objectives that are connected to the community and student skill development.

The Project

As sociology and social work are both fields that focus on application, it is important for students to learn based on real-world problems because they are messy with no

easy or clear-cut solution. Our students also need to gain experience working in teams for their professional careers. The undergraduate students involved in this project were enrolled in an honors poverty studies sociology course. The relevant student learning outcomes of that course are: (1) apply course concepts to help local organizations working to support those living in poverty, and (2) develop transferable, team-based problem-solving skills needed for modern work. The social work students in this project were first year graduate students, enrolled in two sections of a foundational course that focuses on skill development in working with communities and organizations. For the social work students, the relevant student learning outcomes are: (1) Demonstrate an ability to use assessment and change strategies in practice with communities and organizations, (2) Demonstrate an ability to work effectively in task groups or teams, and (3) Demonstrate an ability to initiate actions to achieve community/organizational goals and enhance capacities.

In partnership with District C, an educational non-profit, we adapted and implemented a design thinking-based community-engaged applied learning program to give students an opportunity to engage in the design process and work with and for a community partner on a real problem. District C is a non-profit organization that focuses on addressing the disconnect between how schools were educating students and the skills that businesses were seeking. Originally developed for high school students, the District C experience uses the design thinking steps outlined above and structures the learning experience so that student teams work with a community partner to identify and develop a solution to a problem that the organization is facing. To support student learning and skill development during this process, they are taught four mindsets (analytical, design, collective, self-aware) and a set of tools within each of those mindsets. These tools provide students with the skills necessary to succeed in both their design project as well as working together as a team.

The goal of this project was to implement the District C model and determine if it would address the three challenges that we outlined above: enable students to work better as part of a team, gain experience working with a community organization, and connect course material to their applied experience. We utilized written reflections from the students to determine if the implementation of the model was successful.

As part of our partnership, we were first trained in District C's model. This included taking on the student role and engaging in the design process with a team and then learning strategies to support and coach our students. With further support from District C, we developed plans to adapt the model for our classes. Key to our implementation of the program is the use of a flipped classroom design with most of the teamwork occurring during guided class sessions. Student teams only met outside of class if they felt it was needed.

Implementation

The implementation of the project occurred in several steps before and during the semester. The first step involved identifying community partners and working with them to develop an appropriate problem statement. Our criteria for the statements were that it had to be a problem rather than a project and it had to be an issue identified by the organization. Before the semester started, the first and second authors worked with District C staff to help identify community partners and educate the partners about the process and needed commitments. Expectations for the community partners were that they would meet with student teams twice (in person or via zoom) to provide information and answer questions, potentially share relevant documents, such as policy manuals, and participate in the pitch or presentation event where they would hear the team's ideas and ask them about the prototypes. Community partners were also informed that they would receive copies of all the prototypes.

For our community partners, we focused on non-profits who predominantly served individuals and families from a lower-socioeconomic background. The poverty studies sociology course partnered with two community agencies. The first was a nonprofit that focused on child development which included a children's museum, and the second was a nonprofit that focused on food access and insecurity. The social work students worked with one of three community agencies. The first was a nonprofit focused on STEM education and youth development, particularly for youth from lower-socio-economic families. The second organization was a charter school that primarily serves young girls from lower-socioeconomic families. The third was a nonprofit that provides services and support for those transitioning out of the correctional system.

Project Design

To implement the District C model, students were coached through a variety of activities during each of the five steps of the design process and are described below. However, before engaging with the community partner, students learned more about the design process, psychological safety, and developed a team contract. Next, they were led through a design sprint activity to familiarize themselves with the design process. All of the major activities occurred during class time so that students could receive coaching and immediate feedback. This also allowed students to practice their teamwork and communication skills when all teammates were present. Examples of this included a team contract, a team check-in at the start of class sessions, and structured time for teammates to share ideas before they moved on to other activities. Overall, students completed some individual tasks outside of class as homework or the need arose, such as additional research on the organization or their review and synthesis of notes from interviews (see below).

For the first stage, *Empathize*, students were given the problem statement from the organization and given time to conduct research and develop interview questions.

Classes were divided so that each team worked with only one community partner and each community partner had at least two teams within a class working with them. As they developed their interview questions, teams also made decisions about how they would approach the interview. Some teams opted to have a primary interviewer with others taking notes and other teams opted to share the interviewing role amongst team members. During the next class session, they interviewed the community partner as a team. Teams had the opportunity to see each other interview and to adjust their questions based on answers that previous teams asked.

After completing the interviews, teams were led through activities in the second stage, *Define*, to help synthesize what they learned and develop a new problem statement. In particular, the following class sessions were devoted to guiding the teams through a root cause analysis and mind mapping activity to identify deeper insights or challenges that were creating or influencing the initial problem identified by the organization. After synthesizing the information and ideas, teams were given the opportunity to interview the community partner again as a way to check their insights and assumptions. Teams then crafted new problem and goal statements around the root causes or insights that they identified.

Based on these new definitions, teams moved to the third phase, *Ideate*, where they brainstormed ideas around how to solve that problem. Once they had an idea for their solution, teams were supported as they moved to the fourth stage, *Prototype*, to develop prototypes or examples of their solution that the organization could interact with and use. Prior to moving to the fifth stage, teams completed a dress rehearsal with faculty to get feedback and ideas on their prototype and their presentation or pitch of their idea to the community partner. As the final step in the process, *Test*, teams pitched their solutions to the community partner and tested their ideas in a question-and-answer session.

Methods

To learn more about students' experiences and their perceptions of the value of this model, we asked students to reflect on what they got out of the experience through written reflection papers. The reflection assignment was posted on our Learning Management System (LMS) and students turned in their reflections online using the LMS. After students presented their projects to the community partner, they were provided the opportunity to consent to allow us to use their course materials (including their written reflection papers) in this research study. The study was approved by the University of North Carolina Institutional Review Board #22-0036. Thirteen out of the seventeen students in the undergraduate sociology course consented to the use of their materials, and 36 of 37 graduate social work students consented to the use of their materials.

All of the students were asked the same base set of reflection questions, which were:

1. How did your experience participating in this applied learning experience compare to what you had anticipated it being like? Include your experience working with the community partner as well as your team.
2. How did information we learned in class and through readings connect with your work on this project? Did the readings inform your experience? Did the project inform your interpretation of the readings? How?
3. What was the overall impact of this project for your educational development?

After the conclusion of the course, we downloaded from the LMS all the student reflection papers. The papers were stored on password protected computers that only the researchers had access to. We removed the papers of those who did not consent to have their work included in our research. We then removed student names from the reflection papers. We also removed any information that could be used to identify the community partners. The only identifying information that was included was if they were in the undergraduate sociology course or the graduate social work course. We analyzed the data from the ending reflection papers using the qualitative data analysis software MaxQDA using a thematic analysis method (Braun & Clarke, 2006). We began by familiarizing ourselves with the data by first reading through the papers. Next, we generated initial codes based on our problem statement (is the District C model implementation providing students teamwork skills, meaningful community engagement opportunities, and connections to course materials) and review of assignments during grading. The third author applied the initial codes and generated new ones through a process of constant comparison within and between the papers. The first and second author reviewed codes and definitions with the third author and the initial codes were modified and expanded upon as the analysis process progressed with the goal of determining the effectiveness of the experience. All the initial coding was done by one researcher, and then reviewed by the other two researchers. After the initial codes were created, we began searching for themes. Each researcher read through the documents and initial codes to determine the main themes that were evident. Then together we reviewed the themes that we had identified and worked on defining and naming them. The themes that we identified related to the effectiveness of the model in the courses were Skill Development, Meaningful Experience, and Deeper Understanding. They each have associated subthemes as well. Finally, we connected the themes with the specific quotations and pulled out some of those key quotations to highlight our thematic findings, which are described in the results section below. Table 1 has an example quotation, theme, and subtheme.

Table 1*Thematic Analysis Example*

Quotation	Theme	Subtheme
The applied learning project was fun, engaging, and challenging in unexpected ways... The prospect of working with [organization] and solving a "real world" problem was exciting. The course material and discussions were interesting, but having the opportunity to put them into practice added a personal dimension.	Meaningful experience	Real world experience

Results**Thematic Findings**

As we implemented this model, we intended for our students to get experience working with a team, working with a community partner, and grappling with a messy problem. For the undergraduate and graduate students, the applied learning project provided a novel learning opportunity that was very different from any previous classroom endeavor. The students' ending reflections provided a window into the uniqueness of the learning experience. When asked about how participation in the model compared with what they anticipated and the impact of participation on their development, students wrote about the challenges and the value of engaging in such a unique experience. We identified three interrelated themes from their reflections: Skill Development, Deeper Understanding, and Meaningful Experience. While we distinguish between what the undergraduate and graduate students wrote in their reflections below, we did not see major differences in the students across the three themes.

Skill Development

The first theme that we identified refers to the skills students developed. It addresses the first part of the problem statement, which is enabling students to gain skills working in teams. However, it expanded to more than that with students discussing a variety of different skills they learned and how it will be helpful in their future careers. Throughout the project, students were taught different tools and skills to facilitate the teamwork process, such as ways to encourage active listening and make decisions as a team. Teams were also encouraged to establish rules and norms and trade off leadership and other roles throughout the process. Students

discussed how they used those tools and skills to work with their teammates and additional ones they developed during the experience.

Many students across the undergraduate and graduate courses described having positive experiences with teammates and being pleasantly surprised with how committed their teammates were. One social work student summarized the positive team experience well writing, "I learned that not all group work is terrible and how much can be accomplished when you have a functional team." Students also discussed how this experience helped them think about the different tools and approaches they learned during their participation that can facilitate teamwork and how they might use them going forward. For example, one sociology student wrote, "While I often found myself questioning the team exercises we did in class or the agendas that we made in team meetings, I think that they actually did help my group in creating a prototype for the [organization]." A social work student wrote about how the integration and use of different teamwork tools can improve a team experience:

This project opened my eyes to what an effective group should look like and what is helpful to attain a cohesive group such as hearing everyone's ideas, switching roles from time to time, and making sure you build rapport with your group by talking about more than just the project.

For a few teams, the tools and skills did not carry over into practice for various reasons. For two students, the lack of commitment of teammates was a frustrating experience, with one explaining, "Throughout the project my team was often not on the same page as a result of two of my teammates not pulling their weight in assignments and not taking the class exercises seriously." Similarly, a social work student shared their frustrations around how the team tools and skills were forgotten during a more intense session, writing, "I felt frustrated when we disagreed during one session. Our team-building exercises didn't carry over to when acceptance and openness would come in handy. I didn't feel heard, and it was disappointing."

As they moved through the experience, students took on different roles and had the opportunity to learn different skills. In addition to teamwork skills noted above, students also wrote about more general skills and problem-solving skills. Students also reflected on how the experience gave them an opportunity to practice different professional skills such as preparing for meetings, asking questions in a professional way, and potential areas for growth, with a sociology student explaining:

I got to enhance my communication and interview skills, my leadership, my ability to work well on a team, and I learned how to put together an effective prototype and presentation. I got better at facilitating discussions, taking feedback, and implementing it, looking at a problem from different perspectives, and the list goes on.

In terms of problem-solving, students wrote about how the experience helped them develop their problem-solving skills in general. Several students wrote more specifically about using the design thinking process to help them identify a root cause and define a problem. As one of the social work students explained, "I learned how to find a problem and work to a solution which is something I feel like I would not have gotten if it was not for this project."

Meaningful Experience

Students discussed the meaningfulness of the experience in two key ways: the impact of a real-world experience and the confidence and creativity they develop from the experience working with a community partner. This theme aligned with our problem statement which was to provide students with the opportunity to work directly with a community partner in a meaningful way. For students, the real-world nature of this activity was meaningful in different ways. Some students' reflections focused more on how working for a real organization made the experience meaningful and helped with their intrinsic motivation. For others, the discussion centered more on the idea of human-centered design and their concerns about developing a solution that was appropriate and useful for community partners. One sociology student summarized the magnitude of the work well, writing:

I thought this would be just another group project and presentation but truly, throughout the experience my perception of this class had changed. As I did research on the non-profit we were working with it became more real. I realized that we would be impacting people's lives and impacting an actual community.

Despite the fears and challenges of engaging in such a unique experience, teams developed innovative ideas and were very proud of their work. Some students discussed how the experience gave them confidence and pushed them out of their comfort zones. Many students were surprised by how much they had to offer the community partner. Others talked about the confidence they developed from engaging in such a challenging experience, with one social work student explaining that they became much more confident in working and talking with a community partner. Similarly, a sociology student wrote about how the experience pushed them outside of their comfort zone and how proud they were of their team's accomplishment. Finally, one poverty studies sociology student summarized the experiences of others well, writing:

I am so proud of the accomplishments of my team. We were so passionate about our resolution that we were able to take it to the next level. Each of us learned so much. We got to grow together as we kept learning, and I think that is beautiful.

Deeper Understanding

This theme refers to students' reflections on how the experience impacted their educational development in terms of their knowledge and appreciation of organizations and "wicked" problems. This theme related to our problem statement about incorporating connections to course materials to address these problems. While there were challenges in working with community partners, particularly on zoom, students were pleased with how open the organizations were and how much they were able to learn about the organization and the larger social problems that influenced their work. Across the sociology and social work courses, students reflected on how the experience helped them become more familiar with non-profits and the community overall. For example, a sociology student explained "Learning about the business cycle while also learning how poverty plays a major role in a business decision opened my eyes to a deeper aspect of it all." For others, they learned new things about the community and organizations that serve our residents. A social work student summarized this well:

Our community partner was [] and I'm sad to say that I had no idea what this organization was or that anything like it existed in [our area] prior to this project, even though I've lived here for almost 20 years. I loved getting to know more about them as an organization, especially as it may be helpful for future clients.

Students also discussed how the experience helped them to better understand how complex and multifaceted wicked problems can be at the organizational and community level. For example, one social work student explained "Using strategies like asking 'but why' can be really powerful in thinking through the 'wicked problems' in society." A sociology student further summarized this idea, writing, "Before this project, I did not understand how deep the roots of poverty infiltrated society. Poverty affects so much more than meets the eye. I learned this through the readings and lectures, but it finally started to click during this applied learning project".

Discussion

The goal of this project was to determine the effectiveness of this model that combines design thinking with team-based real-world problem solving. We did this through the analysis of student reflections on the experience. Overall, we have found that this model is beneficial for the students, which was demonstrated in how the model helped them to achieve the student learning outcomes for the courses. They were able to learn skills working in teams, meeting one of their course student learning objectives that will help them for the rest of their time in school and in their careers. They were also able to work directly with a community partner to solve a real-world problem, applying their course knowledge, which met another course objective. Overall, students in both classes gained experience as the drivers

and co-creators of knowledge and in negotiating multiple viewpoints to develop a creative solution for their community partners.

This learning experience was challenging but also rewarding in several ways. First, students described developing specific skills in their reflections related to teamwork and how to effectively solve problems. Design thinking combined with the District C model enabled them to learn these skills through the previously mentioned focus on team communication and solution development (Panke, 2019; Razzouk & Shute, 2012; Micheli et al., 2018). While the teams focused on specific wicked problems related to the courses, such as poverty, the skill sets developed from this experience can help them identify, define, and solve other messy problems in the future.

Second, in line with tenets of constructivist learning theory and community engagement as a high-impact practice (Abderhalden et al., 2016; Bonet & Walters, 2016; Cotten & Thompson, 2017; Johnson & Snyder, 2020; Love & MacIlroy, 2021; Pande & Bharathi, 2020), students described how this was a meaningful experience for them through the impact they made in the community. While there was some trepidation about working with an actual community partner, this project helped students to see messy problems from a more macro and micro lens. Working with the community partner also helped the project to be more meaningful and relevant to the students. In addition, getting feedback from the community partner and hearing appreciation for the team's work and ideas also helped further the student's learning and creative self-efficacy.

Third, students reflected on how the experience allowed them to engage with and develop a deeper understanding of their communities and larger social problems. This comes from the empathize stage in design thinking that encourages students to take a learner's stance (Henriksen et al., 2017; Panke, 2019). The solving of messy problems can be facilitated with design thinking due to co-defining the problem and adjusting as they delve deeper into the problem (Melles et al., 2015; Panke, 2019; Razzouk & Shute, 2012).

We did not find major differences between the undergraduate and graduate students participating in this model. Part of that may be due to the undergraduate students being honors students and the graduate students being in their first year, so they may have had similar experiences. In addition, this can indicate that the model is adaptable to a variety of courses and can be effective in those different circumstances.

Lessons Learned and Recommendations

Overall, as instructors, we found the experience to be enjoyable and rewarding. However, there is room for improvement and adjustments for future implementations in several key areas. First, for the first and second author, design thinking was a new concept and approach. For faculty who are similarly unfamiliar, it can be helpful to get some experience with design thinking themselves by participating in a program like the one we described here (District C) or other

opportunities like a Hackathon or online training. Design thinking has many steps that build on each other, so it is key that the instructor gains training in the entire process. Being able to understand the complexities of design thinking can help faculty to better instruct students in the process. In addition, there are a number of tools and approaches related to design thinking and the design process that are available and participating in an event or training can help faculty identify the model and resources that best meet their needs. Having this more expert level of knowledge will enable instructors to improve the project for the students.

Second, helping teams develop and maintain psychological safety learning was challenging and there is room for improvement in our approach. We were excited about the District C model for its potential to help us support students in learning to work better in teams. We used several strategies to help students improve their teamwork skills including putting students into the same teams throughout the semester so they can build relationships. From the start, teams were introduced to the idea of psychological safety and were asked to use it as a medium to reflect on previous group experiences where they experienced higher and lower levels of psychological safety. With these experiences in mind, they worked to identify ways to develop and maintain psychological safety and record this in their team contracts. These team contracts were created at the beginning of the semester with expectations, roles, and responsibilities. Throughout the project, we had students participate in a team-check in before they started working. While this helped to build connection and safety in the teams, as noted in some of the ending reflections there was still unequal commitment among members. In addition to the check-ins, it may be useful to bring in other best practices, such as having teammates rate each other's work or otherwise give more specific feedback to the instructor and teammates on what is and is not working in the team (Chang & Brickman, 2018; Panke, 2019). Another way to improve the team experience could be in how teams are created. We created teams based on random assignment (graduate) or an interest in working with a particular community partner (undergraduate), but team creation could be improved upon by also considering factors like career interest, teamwork style, and other characteristics. Regardless of how teams are formed, there may be some students who are just generally more committed to teamwork than others.

Third, working with community partners made this a unique and valuable learning experience. However, it can be challenging to work with community partners. They have their own priorities, and they may not be fully aligned with what you need for the course to be successful. We worked with five different community partners for this project. Some challenges that we encountered in working with community partners were missed meetings, not prioritizing this project, and a lack of timely feedback. Despite these challenges, this experience would not be the same if there was no real-world problem to solve, so we encourage you to start building relationships with community partners early and sustaining them over time to show your dedication. These sustained partnerships can overcome some of the challenges described above. It can be helpful to select a theme for the course, such as working with community partners that improve the lives of children. Each community partner can likely work with two or three student groups, so that should also be

taken into consideration when deciding who to work with. It is important to explain to the community partner what is expected of them as well as the potential benefits that they would receive as part of participation in the project so they can decide if they have enough time and resources to participate, and if the potential benefits outweigh the costs.

Finally, while students reported many gains from participating, this type of experience is new and different for students. They may not want to undertake this type of challenging assignment. We recommend that you start from the beginning of the class talking about the importance of the skills gained in this type of experience and how it will help students to be successful in their chosen careers. Uncertainty is part of the process and can help with student growth. Having an activity where students reflect on both what they hope to get out of the course, and then at the end what they did get out of it can help students to understand the learning process that went into the experience.

While we used this design thinking project in social science courses at the undergraduate and graduate level, this process can be adapted to a wide variety of disciplines. Design thinking itself originated in engineering and business fields, so those disciplines would be easily adaptable to this project. The community partner that you choose to work with needs to be selected to align with your discipline or the skills of your discipline (working with an environmental organization with technological needs can work for both environmental sciences students as well as computer science students for example). Having the skills to work well in teams is valuable across all disciplines, especially as it is key to success in so many different careers. The university where we work is a four-year university, but this project can be done at two-year universities as well as high schools, which is where the District C model originated. The model has also been successfully implemented in co-curricular and extra-curricular projects as well, some with shortened time frames, so a full semester is not needed to be successful in this project. No matter which format you use, students will gain knowledge of design thinking, teamwork skills, and the experience of working with a community organization, all of which will be valuable to them as they continue their academic journey as well as after graduation. Since this project is a High Impact Practice, implementing this project will increase the availability of High Impact Practice experiences available to students at their educational institutions (Abderhalden et al., 2016; Cotten & Thompson, 2017).

Limitations

While both classes worked in teams throughout the semester on projects beyond this experience, the master's of social work students worked in teams for longer periods of time. This may have increased their comfort with working in teams compared to the undergraduates. In future studies, we hope to explore more about how the structure and coaching of teams impacts students' experiences and the quality of prototypes they create for community partners. We did not collect information from the community partners beyond brief discussions at the conclusion. While all the community partners indicated this was a valuable

experience for them and they would be interested in doing it again, we hope to collect more detailed information on the impact of participating in this type of activity in the future.

Future Directions

This model has proven to be an effective way to enhance the design thinking model for our classes. In the future, we plan to use this model in co-curricular and interdisciplinary experiences to continue to test its effectiveness. We will continue to refine the best ways to teach teamwork skills to students, since even with the intentional way it was done in the model, there were still teamwork issues. When we teach future iterations of this course, we will be able to explore the long-term benefits of participating in this type of experience for both students and community partners. In addition, we will share our findings with our future students to help them to continue to improve this experience as we move forward. We also plan to expand this model to other disciplines that wrestle with messy problems, such as public administration and public health. We are working with coaches both on our campus and outside of the university to continue to evaluate the success of this model. Because of the importance of this model in career success, we plan to partner with career services in the future to explore how this model can help with student success after graduation.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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