

Innovate with Design Thinking in the Sport Management Capstone Course

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Abstract

This instructional technique review paper outlines an opportunity for sport management instructors to integrate design thinking as a pedagogical tool into their classrooms to align with the demands of today's innovative and evolving sport industry. Design thinking enables students to become designers and to approach problems from an empathetic and creative perspective to promote innovative solutions to a wide range of problems. This paper will introduce design thinking concepts and how they align with advancing sport management curriculum before outlining the steps required for instructors to include design thinking into a sport management capstone class.

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In surveys about hiring priorities, employers routinely emphasize students should develop skills aligned with today's innovation economy (AAC&U, 2015). A 2013 survey found that 95% of employers give preference to college graduates with skills that enable them to contribute to innovation in the workplace, and a 2015 survey found that 91% say the ability to think critically, communicate clearly, and solve complex problems is more important than an applicant's major (Hart Research Associates, 2013; 2015). Employers also placed a priority on hiring students who have direct experience with community problem-solving and applied knowledge in real-world settings (Hart Research Associates, 2015). With the needs of employers in view, the National Association of College and Employers (NACE) published a formal compilation of eight career readiness competencies: critical thinking/problem-solving; oral/written communications; teamwork/collaboration; digital technology; leadership; professionalism/work ethic; career management; and global/intercultural fluency (NACE, 2017). Employers want to hire students who can work on diverse teams to solve complex and ambiguous problems using critical thinking skills and to communicate those results in a professional way using oral/written communication and digital technology.

Career readiness, the attainment and demonstration of requisite competencies that broadly prepare college graduates for a successful transition into the workplace of graduates (NACE, 2017), is priority for sport management educators (Braunstein-Minkove & DeLuca, 2015). Sport management is an applied field that requires students to be ready to think on their toes and apply what they have learned in the classroom in a variety of situations. Sport management programs emphasize critical thinking and

problem-solving through the development of student learning outcomes. The authors examined the publicly disclosed student learning outcomes on the website of the 28 COSMA-accredited universities and found that 20 (71%) identified critical thinking as a measurable student learning outcome. Pedagogical approaches that promote critical thinking help sport management educators prepare career-ready students. The capstone course is an ideal place to provide students a culminating experience that thoughtfully integrates everything learned during college to solve complex, real-world problems. This paper positions DT as a pedagogical approach that leads students to solve complex problems and create innovative solutions within the context of the capstone course. We also explain why DT holds value and promise as a creative problem-solving approach that could be used to solve problems in the sport industry.

What is Design Thinking?

DT is a human-centered mindset and iterative approach to innovation that seeks to understand the user, challenge assumptions, and redefine problems in an attempt to identify alternate strategies and solutions to many types of problems (Dam & Siang, 2018a). DT is a process that has been promoted in both the business (e.g., Brown, 2009) and academic literature (e.g., Glen, Suciu, & Baughn, 2014; Glen, Suciu, Baughn, & Anson, 2015; Martin, 2009) as supporting creativity and innovation by keeping the user, as a human, at the forefront of all design decisions. Prominent design firm IDEO summarizes DT as a process for creative problem-solving that encourages and generates new possibilities (What is Design Thinking, 2018). Design methods align with adaptive reasoning in real-world settings, which makes it a useful tool across many industries (Glen et al., 2014; Glen et al., 2015). Within the business landscape for example, Brown

(2009, p. 86) defined DT as “a discipline that uses the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity.” Research has demonstrated that companies who use DT in their business perform better economically in the marketplace (Dell’Era, Marchesi, & Verganti, 2010; Moultrie & Livesey, 2009). DT also helps prepare students for work in today’s modern business landscape (Rotherham & Willingham, 2010). To help students succeed in today’s interconnected and digital world, educators should “support students in developing and honing 21st century skills (e.g., design thinking, systems thinking, and teamwork skills) that enhance their problem-solving skills and prepare them for college and career” (Shute & Torres, 2012 as cited in Razzouk & Shute, 2012, p. 331).

Design Thinking Curriculum

The primary method used to teach DT is project-based learning (Glen et al., 2015). Brown (2008) points out that in these projects, students are able to experience and experiment with their learning, while also looping back to reflect and assess. Welsh and Dehler (2013) have found that experience in DT can help students develop competence in handling future problems. In addition to developing competence with the innovation process through DT, Glen et al. (2015) found that students who had undergone the DT process within a course project reported growing in areas such as interpersonal skills like teamwork and communication skills, working through biases, and empathizing with others’ perspectives.

Given the rise in popularity of DT over the last decade, Matthews and Wrigley (2017) investigated how business students in universities around the world exposed

students to DT and identified four DT models: (i) human-centered design; (ii) integrative thinking; (iii) design management; and (iv) design as strategy. The most well-known of these approaches is the *human-centered* design strategy, largely made famous by design firm, IDEO. In this strategy, design innovations are rooted in the people or customers they serve, rather than focusing on the tools or processes that exist. This method is intended to be iterative, meaning that there should be multiple rounds of trial and error, and design and re-design as part of the design process. A deeper explanation of the five steps of human-centered design (empathy, defining and (re)framing the problem, ideation, prototyping, and testing) follows this section.

Integrative thinking was the second type of DT found to be used in business schools in Matthews and Wrigley's (2017) study and can be defined as:

... the ability to constructively face the tensions of opposing models, and instead of choosing one at the expense of the other, generating a creative resolution of the tension in the form of a new model that contains elements of both models, but is superior to each. (Martin, 2007, p. 15)

A third form of DT being taught in business programs was *design management* where design became the basis for differentiation and a competitive advantage in the market. This form of design was taught across institutions by focusing on design as being a differentiator, but also improving performance, creating new business opportunities, and just generally being good for business. In other words, design management focuses on *how* design can be incorporated into businesses. Finally, *design as strategy* was a less clearly defined type of design taught across business schools that included a variety of the aforementioned design strategies, including a human-centered approach with the intent of preparing an overall organizational approach to design to improve strategy as well as operations with the goal of generating a sustainable competitive advantage. Together,

these four approaches to teaching DT focus on teaching students to think not like business managers, but rather like designers. This means employing techniques like empathy and innovation together (Matthews & Wrigley, 2017). It also has students coming together to approach problems from a variety of perspectives. DT can be a catalyst on campus for interdisciplinary problem-solving.

Why Design Thinking in Sport Management?

Schulenkorf (2017) noted that while limited literature exists to connect DT specifically with sport management contexts, there are many opportunities to infuse DT into sport management situations. Much of the sport management industry (e.g., managing, selling, marketing, and facilitating sport) is rooted in human interactions and, thus, make human-centered design a particularly relevant approach. DT is a fresh lens for understanding the customer and can lead to innovation in sport contexts rooted in its framework to help sport professionals understand users' needs, motivations, behaviors, and feelings as they consume or participate in sports. DT complements the "who" or "what" found in quantitative data by offering insight into the "why" behind user decisions.

Previous innovation within the sport industry has been incremental in nature, with iterations of the same products and services offered to participants and spectators. Current methods of problem-solving in the sport industry are largely based on exploring behavior from the perspective of what the fan or spectator is doing (i.e. consumer behavior); however, when applying DT, innovative problem-solving can emerge from a "what if" perspective. Deeper understanding from DT provides opportunities to develop products or services with users' needs in mind. Fans and participants often do not know

what they want or they are restricted by only their current offerings or past experiences. DT, however, can uncover latent needs to provide sport organizations with opportunities for innovation and an improved experience. As is the case with most business endeavors, competing for customers is paramount to success. In an especially crowded marketplace and consumption opportunities (e.g., online, on TV, in person) sport organizations need to continually strive to understand consumer needs and wants to sustain their competitive advantage.

Design Thinking Process in the Capstone Course

In architectural terms, a capstone is the stone that forms the top of an arch that holds together an otherwise unstable construction. In educational terms, the capstone is the crowning or culminating experience placed last and on top of the structure beneath it, integrating together all the earlier educational experiences (Hauhart & Grahe, 2015). In 2016, 45% of senior college students in the U.S. completed a culminating senior experience like a capstone course (NSSE, 2016). The capstone experience requires a student to synthesize and integrate knowledge acquired in coursework and other learning experiences and to apply these theories and principles in a situation that approximates some aspect of disciplinary practice. Capstone courses are one of 11 high impact practices and should be designed for the student to complete a signature work that fosters independent research, critical thinking, communication skills, and integrative learning (Hoy & Wolfe, 2016; Schermer & Gray, 2012). Of course, for a capstone course to be successful, there must be a coherent program on which the capstone rests. Courses preceding the capstone should be designed with the capstone course in view to ensure students are prepared to deliver high quality work in the capstone course.

Hauhart and Grahe (2015) identified formats commonly used to guide capstone courses. In the *senior thesis*, students address an important question within the context of the discipline and marshal secondary peer-reviewed sources to support the thesis statement. In the *research project*, students conduct original research. Students compile a representative collection of their work in the *portfolio*, and sport management programs commonly use the practicum or *internship* where students complete a field experience with an outside agency under the supervision of a faculty member. Finally, in *real-world project-based learning*, students engage in problem-based learning to tackle analytical problems in the process of creating a solution to a specified problem. In sport management, it makes sense to connect these projects with industry partners so students are completing projects with real-world consequences. Thus, the project the student produces might be a research paper, senior thesis, a performance, a portfolio of best work, a consulting report prepared for a community partner, product or service, field experience, or a technological innovation. The nature of the product is dependent on the goals and objectives of the program. Regardless of the format chosen, capstone courses typically require students to reflect on personal growth, invest significant time, integrate knowledge, create a tangible work or product, and make a public demonstration of the work (AAC&U, 2011; Buck Institute for Education, 2015; Hauhart & Grahe, 2015; Report, 2017). Table 1 defines these elements of a capstone course.

Insert Table 1 about here

Using DT as a creative problem solving approach aligns with the capstone class because it requires that students integrate knowledge and experiences from many different aspects of their university experience. The emphasis on experimentation and

iteration that exists in DT also aligns strongly with other pedagogical techniques used in sport management like experiential and project-based learning (Glen et al., 2015).

Building on more than just the theoretical or technical material within a course, DT requires students to connect and empathize with the user, participant, or customer. The following section outlines how instructors can apply human-centered design in a sport management capstone class.

Implementation of DT in Capstone

To solve complex problems facing the sport industry, managers need to “frame the problem, understand users intimately, think creatively about possible solutions, use analysis and synthesis to develop and understand systems and their component parts, and collaborate in diverse teams” (Dunne, 2009, p. 32). Human-centered design involves the five stages of empathy, defining and (re)framing the problem, ideation, prototyping, and testing. It is important to note these steps are a part of an iterative and non-linear process. While there are multiple approaches to implementation of DT, an overarching theme to DT is that there is more than one right way to accomplish a project (Lockwood, 2010).

Stage 1: Empathize

Empathy refers to putting oneself in the shoes of the user. Empathy is the core value that creates the foundation for designers to develop products, services, and experiences that are both innovative and responsive to actual user needs and desires (Battarbee, Suri, & Gibbs Howard, 2014). Users include a diverse array of stakeholders including employees, suppliers, buyers, customers, residents, or anyone considered an end-user of the product or service. Teaching students to empathize builds a skill set useful because “people who cannot temporarily let go of their role or status or set aside

their own expertise or opinion will fail to empathize with others who have conflicting thoughts, experiences, or mental models” (Battarbee et al., 2014, p. 3). Empathy forces students to set aside preconceptions and assumptions about the way a product or service works, and instead challenge improvements and innovations in line with what users want and need (Virtual Crash Course, 2018).

Going to where users are to understand what they say and do forms the basis for deepening empathy for others. The goal of contextual inquiry is to help students understand “why users act as they do, and how users make sense of what they do for themselves and for others” (Beckman & Barry, 2007, p. 32). Ethnographic research methods, like contextual inquiry, use interviews and observations to place the student in the midst of the user’s environment where they can understand his or her experience while it is happening, to better understand how users think and feel. For example, if students are trying to enhance the experience of participants in a youth sports league, they could use ethnographic research methods like observation and interviewing to empathize with board members, coaches, parents, officials, and athletes. Students should read about the research methods prior to being presented with an opportunity to practice the method in a mock environment in the classroom setting. Students benefit from previous exposure to these methods in research methods courses or in the general education curriculum. Ethnographic research methods commonly used in DT are listed in Table 2.

Insert Table 2 about here

Stage 2: (Re)define the Problem

After collecting data using contextual inquiry, students need to synthesize the data to develop insights in a way that places users’ needs at the center of the search for

innovative solutions. Before the search for solutions begins, however, it is important to step back and make sure the correct questions are being asked. DT is an especially useful framework to uncover problems that are ill-defined by reframing the issues in a human-centric way (Dam & Siang, 2018a). The goal of this stage is to develop a deep understanding of users by synthesizing the data and then develop an actionable problem statement that is rooted in the insights uncovered in the empathy research. A good problem statement frames the problem, inspires the student team and stakeholders, and focuses the work of the group (Both & Baggereor, n.d.).

The first step in the synthesis process is to let students communicate their observations and learnings with their group members. Post-it or “sticky” notes are particularly useful in this process. Students should write down all of their stories, ideas, observations, or statements on the sticky notes (one headline comment per sheet). Then, students should find themes and sort the notes into groups and subgroups. The instructor should guide this exercise with students to ensure that students group the sticky notes in different ways over a set period. This process allows students to probe for more information to “draw out more nuance and meaning from the experience” than initially realized (Both & Baggereor, n.d.). The process of sharing and sorting helps to understand each user and the needs they have related to the problem space. The purpose of synthesizing the data is to create insights useful for creating solutions. Insight statements are the three to four succinct sentences that drive the design forward. Students should take one of the themes and rephrase it as a short statement (IDEO, 2015). Insight statements vary by the nature of the problem space, but examples of statements include:

- Families want a _____

- Mothers greatly prefer _____
- _____ is a defining quality of the experience
- Without _____, the experience will [not] _____
- Most people feel _____, but they still _____
- _____ makes people feel _____
- Participants feel burdened by _____
- _____ type of user avoids _____ and instead _____

These three to four insight statements help frame the problem students are trying to solve. Appropriate time and attention should be given to defining the problem to ensure it aligns with user needs and not simply founded in assumptions. Once one or more insight statements emerge, the next step is to translate the insight statement into an opportunity for design by reframing it by adding “how might we” in front of it. For example, students tasked with redesigning the youth sports travel experience for families at a mega sports facility create an insight statement that reads: “Families feel bored and trapped at the venue because they have a significant amount of downtime between games during the weekend due to the 2–3 hours between games.” Sample *how might we* statements could be:

- How might we make downtime the most exciting part of the experience?
- How might we make the downtime between games like a vacation?
- How might we help families feel alive instead of trapped?
- How might we entertain parents, athletes, and their siblings?
- How might we eliminate downtime?

- How might we provide more time between games to allow families to leave the park?

Reframing the problem into a “how might we” statement makes the problem actionable and allows tangible ways to participate in the third stage of DT, which is to ideate. It is important for students to realize they may need to redefine the problem based on the results that emerge from the empathy stage. Table 3 presents additional analytical tools that supplement the synthesis process.

Insert Table 3 about here

Stage 3: Ideate

Brainstorming is at the core of the ideation stage, where designers start using their research, insights, and expertise to come up with possible solutions to the “how might we” statement framed in the previous stage. At this stage, designers engage in divergent thinking to multiply options and create choices (Brown, 2009). Insights from previous stages should be leveraged and integrated into possible solutions. The instructor of the course is best positioned to lead students through ideation sessions (classes). Students should be encouraged to create wild ideas while deferring judgment about those ideas. A key principle is that the process of generating and evaluating ideas are kept separate.

Contrary to popular perception, ideation is more structured than “throwing outside-the-box ideas at the wall to see what sticks.” The authors have found six structured exercises to be particularly helpful for students in the ideation stage.

1. **Creative matrix** (LUMA Workplace): Template for generating new ideas where topics intersect. Columns represent categories related to people (users, market segments) and the rows are categories for creating solutions

(e.g. policies, events, programs, facilities, environments, technology, hangouts, competitions, video, senses). A variety of concepts will develop within each cell of the matrix.

2. **Alternative worlds:** Takes a critical quality one might want to infuse into the solution, and makes analogies to real-world business brands that embody that quality. For example, “How would Disney entertain people in this line?”
3. **Impact-Difficulty matrix** (LUMA Workplace): Places all ideas on a 2x2 matrix with Importance (low to high) on the x-axis and Difficulty (low to high) on the y-axis. This process reveals a categorization for ideas including: high return on investment, strategic priority, luxury, and low hanging fruit.
4. **Formulate design criteria** (Both & Baggereor, n.d.): As students navigate divergent thinking in the brainstorming process, unifying elements of the solution should start to emerge and form the design principles for the solution. Design criteria serve as the guardrails for the solution, creating principles for the solution independent of the actual implementation of the solution. It is an exercise that forces students to distill their understanding of the problem and the user in a way that outlines the necessary components to achieving success in solving the challenge. For example, the design principle for students encouraging children to be more physically active in a certain community might be: “Use small spaces to

spark unorganized play.” While this does not dictate the specific solution, it provides the guardrail for the solution that will be developed.

5. **Concept poster** (LUMA Workplace): Students create a visual representation that communicates what the idea is, why it matters, and how it works.
6. **Napkin pitch** (Liedtka & Ogilvie, 2011): An oral presentation version of the concept poster, this oral pitch defines the unmet needs of the user, the approach to meeting the need, how the user benefits, and what competition or difficulty the concept will face in implementation.

Stage 4: Prototype

The fourth stage in DT is to rapidly prototype one or more of the concepts that emerged from the ideation stage. Prototyping is meant to adopt a “thinking by doing” mentality (Dam & Siang, 2018b, para 9) by finding ways to test ideas more tangibly, rather than leaving the brainstormed idea in the abstract (Virtual Crash Course, 2018). Tim Brown, the CEO of IDEO, explains that while prototyping takes time and resources, it can also help avoid launching a weak idea, causing complications and costs later on (Dam & Siang, 2017). Failure is encouraged during this stage as part of an iterative design process. It is more important at this stage to create an experience for the user to interact with than to have the perfect to-scale model of the solution concept.

Once the list of ideas is generated, students should share their ideas with users to solicit and capture feedback through a co-creation process, which even allows users to help design with the student. Prototypes that can include physical creations, storyboards, storytelling, creating videos, or role-playing (Dam & Siang, 2018b). One particular

activity favored by the authors is an activity called “Buy a Feature” (LUMA Workplace). Based on the notion that price measures value, the game is designed to help elicit the truth about what people value, not just what they say they value. Using fake money and a game board, students give participants \$1,200 to spend on 10-15 features priced at \$100, \$300, or \$500. Users place their money on the features they would most like to see. This method uses a system of constraints that create tension by offering choices that exceed available resources. It simulates the conditions that exist when people have to budget their resources to get what they truly desire. Because users are provided with a limited amount of currency with which to buy items, they have to pick and choose which are most important.

This type of feedback can help determine which idea or combination of ideas is best suited to move forward. Rapidly pivoting the concept through low-fidelity prototyping allows students to keep the user at the center of the design. This process serves to test the students’ hypotheses about the users’ needs and how they will react to the new solution. The prototyping stage adds a valuable step in sport contexts. Typical sport offerings are not released until fans can see a finished product, which limits the feedback from fans to only the finished product. Early and frequent prototyping allows professionals to learn and adjust quickly before deciding on the final product. Prototyping can reduce the overall production time, eliminate undesirable finished products, and prioritize important features required by fans and participants.

Stage 5: Test

The final stage then would involve testing a higher-resolution version of the prototype. Testing should still be about gathering and learning from user and designer

feedback and by weighing the pros and cons of the prototyped ideas (Dam & Siang, 2018b). This five-stage process is iterative, meaning that the stages are constantly revisited. Prototyping should be done quickly and frequently to loop back and forth between ideation, testing, and feedback. Once the prototype is tested, new data and feedback will emerge which may further frame the issues or develop new issues, which will require additional ideation, prototyping, and testing. At this stage of an iterative process, students may find it frustrating to go back to one of the previous stages, or go “back to the drawing board,” but this experience provides a real-world experience in failure and responding positively to constructive criticism. It may be difficult to get to this stage within a traditional academic semester, and the instructor may want to substitute this stage for the creation of final presentation materials.

Course Preparation

This section provides practical advice to faculty seeking to apply DT in the context of a sport management capstone course. We advocate that a capstone course is the best placement for a course entirely dedicated to using the DT methodology due to the level of research, critical thinking, and concept testing required within the course of a semester. Designing the curriculum backward from the capstone, however, leads to many opportunities within the coursework to expose students to concepts they will use in capstone in an integrated way. Rather than adding courses, the design approach could serve as a way to coordinate and synthesize the skills learned in courses that already exist. In a DT-based capstone course, students learn problem framing, ethnographic research, abductive reasoning, synthesis, and collaboration (Dunne, 2009). Table 4 posits potential learning outcomes for a course.

Insert Table 4 about here

Selecting and Scoping the Design Challenge

DT allows instructors to incorporate problems of practice in line with 21st century skills (Henriksen, Richardson, & Mehta, 2017; Robinson, 2011). A problem of practice is a “complex and sizeable, yet still actionable, problem which exists within a professional’s sphere of work” (Henriksen et al., 2017, p. 142). Ultimately, DT should be applied to subjective challenges that impact *people* where there is no obvious or correct answer. DT works well when students are seeking a meaningful problem to solve, or the right solution to a problem. The key principle in scoping the design challenge for students is to constrain the challenge space but broaden the solution space. A narrow framing of the challenge makes the project actionable and allows students to deeply understand a specific aspect of people’s lives. The project should be framed so that neither the solution nor the form of the solution is known at the beginning (Both, 2016). While all projects face constraints that influence the viable form of the solution, students should be encouraged to think broadly about the form a solution should take. The instructor should ultimately believe that the goal of the project work is clear without dictating the specific solution that should be found by students.

Both (2016) recommends selecting projects that students can complete with singular products, services, or experiences, rather than tackling a strategy or systems-level challenge. For example, designing a new community recreational center to combat childhood obesity may be too broad and complex, but asking students to design programming for a weeklong camp for a specific target market is more manageable, because it can be communicated in a single concept. Second, projects should be bold

enough to have real consequences for stakeholders, and room for experimentation and failure along the way. Table 5 is a tool to help faculty scope design challenges that create an actionable direction while also leaving room for students to discover and explore. The level of ambiguity in the design challenge should be determined by the level of the class, the students' previous experience with DT, and the length of time available for students to complete the project.

Insert Table 5 about here

Working With an Industry Partner

Industry-linked capstones require faculty and students to be flexible as they work to maintain relationships, and may involve the complicated dilemmas that can be important to students' learning experiences (Hoy & Wolfe, 2016). Projects completed for an industry partner should be negotiated with ample lead time prior to the start of the semester to allow the project to be appropriately scoped. Typically, the partner begins a project by wanting to solve a certain problem. It is important to explain to the partner that the DT approach may not always confirm the perceived problem is the actual problem. Instead, it may point to a different problem set entirely. The value for students is the experience conducting empathy-based research to frame, and in many cases reframe, the original project for the industry partner. This turns the traditional paradigm of applied research or consulting in the classroom on its head. Instead of waiting for a specific problem (assignment) and looking for a specific solution, students must instead collect original empathy data and critically examine what it means to define the actual problem before starting on a search for solutions. As a result, be prepared for students to initially struggle with DT because they are accustomed to looking at problems in a linear manner

where most of the time is spent trying to justify a shallow solution to an ill-defined problem.

Conclusion

DT provides faculty with a framework for teaching students how to critically examine ill-defined problems and develop the innovative thinking and solutions sought by employers. At a time when higher education is pressed on all sides to articulate its value to society, it is incumbent on educators to prepare students to solve complex problems in a wide variety of contexts. DT puts a process and method behind the nearly universal claim that college prepares students to think critically.

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Table 1

Capstone Course Elements

Reflect on personal growth	Students are provided structured opportunities to reflect and integrate learning. Reflections allow students to make personal connections with the topic, make sense of the entire college experience, apply those insights to their future, and prepare them for their next stage of career development.
Invest significant time	Students contribute a significant investment of time and effort over an extended period of time. During these periods, students are typically revising and refining their work through ongoing collaboration and interaction with faculty members who provide frequently, timely, and constructive feedback. In some cases, student peers and community partners may also provide feedback to students.
Integrate knowledge	Students integrate the content, knowledge, and skills acquired during their coursework leading up to the capstone. Students are encouraged to reflect on and see the connections between their studies and experiences, thus discovering the relevance of learning in the discipline.
Create a tangible work, artifact, or product	The student's effort results in a tangible work, artifact, or product marked by an appropriately high level of expectation. The final outcome can take many different forms based on the nature of the project or assignment. The artifact is assessed in a way that contributes to meaningful evaluation of student learning outcomes and serves as a performance measure for the unit/program.
Make a public demonstration	At the end of the culminating experience, students present the outcomes of their work to a public audience. There are many ways to make the work public; such as placing it online, displaying it on a wall, making a presentation, sharing at a showcase, or providing a product or service to be used by others.

Table 2

Summary of Ethnographic Research Methods

Method	Purpose	How To
Ethnographic Interview	Elicit information from users about what they are doing and why they are doing it. Consider interviewing mainstream users and extreme users.	Develop a semi-structured interview guide that starts broad by asking questions about the person's life and values before asking more specific questions related to the design challenge.
Group Interview	Come to a quick understanding of a group's needs.	Have one person asking questions and another recording the group's dialogue. Engage all members of the group.
Expert Interview	Bring the students up to speed on a topic and give key insights into relevant history and context.	Select experts with different points of view on your design challenge.
Passive Observation	Observe participant behaviors in the context of their lives as a fly on the wall. Can be achieved in-person or through capture of relevant video footage.	Identify a natural setting relevant to users. Without making direct contact with users, observe their actions. Make assessments about what they are doing, how they are doing it, and why they are doing it that way.
Active Observation	Become a part of the action by living an experience with your users.	Shadow users for a day while they complete their tasks. Become a member of the team or group and learn to do what they do.
Intercepts	Hang out with users in a less formal setting than ethnographic interviews.	Allow users to take the conversation in a less guided fashion than a formal interview script.
Mystery Shopper	Pose as a customer unbeknownst to the service workers to evaluate service delivery.	Use a pre-determined protocol to compare the results of the mystery shopping experience.
Ecological Momentary Assessments	Collect multiple self-report assessments per day using mobile technology.	Participants submit photo diaries, text diaries. and answer survey questions through text messaging and apps.

Table 3

Problem Framing Methods

Method	Definition	Purpose
Journey Mapping	Graphical representation of the user's experience as he or she works to accomplish something of importance to him or her.	Illustrates the users' emotional highs and lows, organizational touch points, pain points, work-arounds, and the step-by-step flow of an experience.
Empathy Mapping	Answer four questions: Say: What are quotes and defining words your user said? Do: What actions did you notice? Think: What might the user be thinking? Feel: What emotions is the user feeling?	Identifies unmet emotional or physical needs that lead to key insights that can be leveraged to respond to the design challenge.
What? How? Why?	Address 3 questions: What: What is the user doing? Be specific and objective. How: How is the user doing what they are doing? Use descriptive phrases with many adjectives. Why: Why is the user doing what they're doing, and in the way they are doing it? Requires student to make educated guesses regarding emotions and motives.	Moves student from simple concrete observation to more abstract emotions and motives.
Personas	Fictional character that typifies different types of users created from synthesis of characteristics of different users observed and interviewed.	Brings users to life using psychographic themes that reveal differences within and between persona groups. Compare or differentiate personas using a 2 x 2 matrix with four quadrants. Personas should focus more on emotions, motives, and habits rather than demographic characteristics.

Interview Summary Poster	Use large sheets of paper to depict key information about each person interviewed. Ideally, these sheets can be easily moved around to help organize users into groups and subgroups.	Allows all team members to get up to speed on large quantity of interview data in a short period of time.
Problem Tree Analysis	Maps causes and effects to understand the chain of events that created the current situation	Using a tree as a metaphor, helps students to understand causes and effects

Table 4

Student Learning Outcomes in a Design Thinking Capstone Course

Topical Area	Potential Student Learning Outcomes
Problem Framing	<ul style="list-style-type: none"> • Use user-research to identify, frame, and diagnose a problem.
Ethnographic Research	<ul style="list-style-type: none"> • Create an interview protocol. • Conduct, record, and transcribe interviews with users. • Observe participants in natural settings.
Synthesis	<ul style="list-style-type: none"> • Integrate analytical and synthesis models to arrive at conclusion. • Recognize relationships between component parts of a problem. • Develop insight statements about users.
Abductive Reasoning	<ul style="list-style-type: none"> • Identify and confront implicit assumptions by generating alternative solutions to problems through a creative process.
Collaboration	<ul style="list-style-type: none"> • Work in diverse teams to confront assumptions and work collectively toward a solution. • Individually make a positive contribution to the group by contributing to work, interacting with teammates, keeping the team on track, delivering quality work, and possessing needed knowledge and skills. • Demonstrate interdependence and cohesion as a group.

Table 5

Framing the Design Challenge

Element	Definition	Questions Answered	Example	Example	Example
What	Define the challenge space	What human experience are you trying to affect?	Redesign the youth sports travel experience	Create ways to encourage free play	Redesign the ticket purchase experience
For whom	Define the users you are designing for	Which specific user group are you designing for?	For families	For children between 6 and 10 years old	For business-to-business buyers
Context	Define the context in which the challenge is being completed	What key facts or insights are known that set context and explain why it matters?	Keeping in mind the significant investment they make in time and money	In a world where they spend more time in front of screens and the cost of youth sports is increasing	Keeping in mind ticket usage has decreased the last 3 years
Goals	Define the goals of the project	What are students trying to accomplish?	Your aim is to create a concept for a meaningful product, service, or experience that could be used by athletes and families	Your aim is to create a concept for a meaningful product, service, or experience that could be used by children	Your aim is to create a new approach to delivering value to business-to-business buyers

Adapted from *Design Project Scoping Guide* written by Thomas Both (2016) at the Hasso Plattner Institute of Design at Stanford.