

Advancing the Design Thinking Mindset in Secondary and Post-Secondary Business Education

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Abstract

Little is known about the use of design thinking in business education. This descriptive, quantitative study was situated in a theoretical framework of social constructivism and experiential learning, and sought to discover to what extent secondary and post-secondary business educators are implementing design thinking. Secondary teachers are embedding design thinking into information technology and entrepreneurship courses, and post-secondary instructors are embedding design thinking into management, general business, and information technology courses. Lack of knowledge is the main reason business educators do not use design thinking. Business educators confirmed that reflection is essential to the design thinking process, and class discussion was the instructional approach most used to foster reflection. It is likely that business school faculty have not been exposed to designers in either their corporate careers or their own business school education, and need to learn the design thinking mindset, tools, and pedagogies in order to implement them into business courses.

Keywords: design thinking, business education, experiential learning, social constructivism, instructional approaches, Stanford Design Thinking Framework

Introduction

Numerous studies have identified a new set of skills that are needed to prepare 21st century learners to thrive in an ever-changing world. Topping the list of skills needed for today's advancement of innovation in science and technology in a globalized society include critical thinking, communication, and creativity (Roslaniec, 2018). Educational systems need to transform curriculum that will prepare students to develop curiosity and resilience, have self-regulation, respect the ideas and values of others, and persevere when confronted with failure and rejection (OECD, 2018, p. 2). One of the most "fundamental human cognitive processes" (Rahman, 2019, p.64) is the skill of problem-solving. It is a critical and essential life skill for every job in every industry (CareerBuilder, 2021). Problem-solving is a complex process that includes observation and critical thinking skills, and each of these skills relies on additional skill development. A strategic approach educators can adopt to develop the problem-solving skills of 21st-century learners is a design thinking mindset.

Design thinking is a human-centered approach that draws on students to engage in innovative and creative problem-solving. Efeoglu et al. (2013) defined design thinking as “a human-centered problem solving method that mostly leads to radical innovative solution in terms of the feasibility, desirability and viability of products or services” (p. 241). Brown (2008) considers innovation to be the core of design thinking. Gibbons (2016) asserted that a design thinking approach to problem-solving may lead to innovation and a competitive advantage.

Review of the Literature

Design Thinking in Secondary and Post-Secondary Education

The traditional approaches to teaching problem-solving to students at the K-12 level seem to be ineffective in developing the 21st-century skills of creativity and innovation (Luka, 2014). At the middle level, research findings indicated when design thinking was used, students were able to utilize their imagination, develop creative confidence, and develop a prototyping mindset (M. Carroll, 2014; Carrol et al., 2010). Design thinking was also found to elevate students’ choice and voice (Durkin, 2021). In contrast, Panke (2019) concluded that it is possible for students to experience potential negative outcomes such as anxiety, frustration, and a lack of confidence in their creativity.

Many secondary schools are also faced with the challenges of effectively developing entrepreneurship, creativity, and innovation under the current educational system (Androutsos & Brinia, 2019). The findings of recent studies indicated that design thinking has a positive impact on the learning of secondary students. Aflatoony et al. (2018) was focused on evaluating design thinking skills of secondary students and found that problem-solving, human-centeredness, and collaboration skills all increased. Hennessey and Mueller (2020) investigated how educators perceive design thinking integrating into their classrooms and found that educators had a positive attitude towards the design thinking framework.

At the post-secondary level, design thinking is wide-spread in many academic disciplines such as the Science, Technology, Engineering & Mathematics (STEM) strand (Mentzer et al., 2015); engineering (Plattner et al., 2011), medical education (Gottlieb et al., 2017), and art education (Watson, 2015). However, design thinking has evolved into a “pedagogical phenomenon...due to its widespread relevance across many disciplines” (Beligatamulla et al., 2019, p. 91) and is now also used in disciplines like computer science and software engineering (Sohaib et al., 2019; Valentim et al., 2017), software development (Parizi et al., 2022), and information technology education (Henriksen et al., 2017; Lin et al., 2020; Su & Xu, 2020). In information technology education design thinking has been credited with developing 21st century skills, especially creativity (Henriksen et al., 2017).

Business education has been slow to adopt design thinking, even though Dunne and Martin (2006) explained the need for it, saying, “today’s business people don’t need to understand designers better, they need to become designers” (p. 513). While Matthews and Wrigley (2017) found that design thinking was growing in higher education, Pande and Bharathi (2020) found a lack of published studies connecting design thinking to management education. The Rotman School of Management at the University of Toronto, Canada, integrates design thinking into business education because they believed their business students were not equipped with

problem-solving skills (Çeviker-Çınar et al., 2017; Matthews & Wrigley, 2017). Although one of the newer business sub-disciplines, entrepreneurship education has been on the forefront of implementing design thinking into business education. The Lean Startup movement (Ries, 2011), a method to develop startups and inspired by Toyota's lean manufacturing processes, is credited with expanding principles of design thinking into the world of entrepreneurs.

Design Thinking Models

While there are many variations of design thinking models (Parizi et al., 2022; Watson, 2015) one of the most well-known design thinking models for problem-solving is the Stanford Design Thinking Framework, and this was used to conceptualize the present research study. The Stanford Design Thinking Framework is a research-based methodology for creative problem-solving and is used by Fortune 500 companies such as Apple, Google, Samsung, and General Electric as a viable problem-solving model (Dam & Siang, 2020). Tu et al. (2018) conducted a study using the Stanford Design Thinking Framework to determine the effectiveness of this model. The findings indicated this framework, implemented as a creativity teaching strategy, has the potential to promote student participation, improve teaching, support student learning, and deepen discussion skills.

A review of existing literature was conducted to learn the instructional approaches and resources used in each stage of design thinking. The five stages that define the Stanford Design Thinking Framework are Empathize, Define, Ideate, Prototype, and Test. The key to the Empathize stage is that it begins with people and requires connecting with the needs of the end user. This approach focuses on understanding a problem from a new perspective, which can aid in empathizing with the people affected by the problem (Gallagher & Thordarson, 2020). Potential tools to accomplish the first stage could include empathy maps, artifacts from interviews, and personas. "The most powerful means for students to develop empathy is through direct, in person, observation and interviews of the target population in the context of their lives or work" (Glen, et al., 2015, p. 186).

In the Define stage of design thinking, the insights of the information collected in the empathy stage are analyzed to provide clarity and focus to the problem. Approaches used in this stage could include affinity mapping or story and journey mapping. Ultimately this stage leads to a point of view statement that guides the remaining stages of this design thinking model (Gallagher & Thordarson, 2020). In the Ideation stage, brainstorming is performed to generate ideas. To facilitate this stage, activities like wacky introductions, 30 circles, two buckets, and crazy 8's, can be used to generate ideas (Gallagher & Thordarson, 2020). Based on the results of the Ideate stage, the design thinking model moves into the fourth stage, Prototype.

The Prototype stage moves ideas into action and is often one of the most challenging primarily because an idea might or might not work as defined in the ideate stage (Gallagher & Thordarson, 2020). Prototyping in design thinking should be "as fast and cheap as possible" (Glen, et al., 2015, p. 182) as its purpose is to create representations of ideas in order to learn and get feedback from customers on them (Glen et al., 2015). When a prototype fails, which is encouraged, it then requires a visit back to the ideate stage to generate new ideas. Examples of prototypes could include brochures, storyboards, diagrams, models, roleplay, or anything that encourages users to interact and give feedback (Del Pino Galvan, 2012). Prototypes are encouraged to be relevant,

tangible, and developed in rough draft form (Gallagher & Thordarson, 2020). Demonstrating a prototype of a new or improved product, service or process by creating a video or a slide presentation also works, as the concept of “show don’t tell” (Doorley, et al., 2018, p. 56) is a critical way of letting users experience the prototype.

The final stage of the Stanford Design Thinking Framework is Test. In this phase, the users provide feedback on how well the prototype addresses the problem. The test stage is critical, offering the feedback needed to determine if the problem has been solved for the end-user and if so, the process moves into implementation. If the test phase indicates the problem has not been solved, it is necessary to return to any of the design thinking stages. The design thinking process is not linear. As often as necessary the prototype, test, feedback stages can be repeated until a solution is implemented.

Theoretical Framework

This study is situated in a broad theoretical framework of experiential learning, social constructivist learning theory, and reflection. Dewey’s (1933) ideas about learning laid the foundation for integrating experiences into curriculum. Dewey believed that learning came through experience, that experiences build on each other, that learning is situational, and teachers are responsible for creating the learning experiences for their students. Dewey advocated for learning through real-world problem-solving approaches. Kolb’s (1984) experiential learning model builds on Dewey’s ideas and is a conceptual model that describes learning as “the process whereby knowledge is created through the transformation of experience” (p. 26). The experiential learning cycle is based on Kolb’s ideas that learning is a process, ideas are continually reimagined through experiences, learning involves both people and the environment they are in, and the process of learning happens through experiences and reflection on those experiences.

Constructivism

The dominant modern educational approach to designing instruction is based on the theory of constructivism (Bruner, 1966; Dewey, 1929; Piaget, 1952; Vygotsky, 1978), and constructivism informs experiential learning theory. Constructivism states that individuals construct new knowledge from their experiences by interacting with other people and the environment (Fosnot, 1996; Gagnon & Collay, 2001; Grennon-Brooks & Brooks, 1999). In contrast to behaviorism (Skinner, 1938), where the instructor is the expert in the classroom and repetition is the desired way to learn, constructivism focuses on constructing meaning, not memorizing facts. Instruction becomes student-centered instead of teacher-centered, and instructors are responsible for organizing learning activities for students. Instructors who use constructivism to teach pose problems that are relevant to students’ lives or professions, allow learners to work together to solve problems, help build on prior knowledge, create authentic, real-world and hands-on learning experiences, and have students reflect on their learning (Grennon-Brooks & Brooks, 1999).

Specific to management education, Pande and Bharathi (2020) mapped constructivism learning theory with design thinking using the activities of a design thinking workshop in an information technology business management program at a business school in India. The authors found close linkages between constructivist tenets and activities performed in design thinking; for example,

creating new knowledge (Vygotsky, 1978) was performed through the prototyping phase, and experiential learning (Kolb, 1984) was performed through the testing phase.

Reflection

A critical element of experiential learning theory and social constructivism is reflection, which is “intentional consideration of an experience in light of particular learning objectives” (Hatcher & Bringle, 1997, p. 153). Research has shown that reflection is a proven method for helping to increase depth of understanding in an experiential course (Ions & Sutcliffe, 2020; Lang & McNaught, 2013; Maurer et al., 2021; Perusso et al., 2019; Robertson et al., 2021). Dewey (1933) defined reflection as, “active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends” (p. 118). Reflection is a metacognitive skill, and this skill requires students to think about how they think, creating self-directed learners and building critical thinking skills (Krathwohl, 2002; Martinez, 2006).

Purpose of the Study

Although design thinking has been researched and integrated into many academic disciplines, much less is known about the use of design thinking in business education. The purpose of the study was to understand more about the use of design thinking in American secondary and post-secondary business education. Two research questions grew out of existing literature: To what extent are business educators implementing design thinking in their courses? What instructional techniques and/or approaches are being used to teach design thinking?

There are several audiences for which the findings from this study are useful. Business educators will be able to see how and why other business educators in the United States are using, or not using, design thinking. They will also learn which instructional approaches are being used during each mode of design thinking. Administrators will learn how and why to support their teaching staffs’ use of design thinking. Employers will learn how design thinking is being implemented in secondary and post-secondary business courses, and which business sub-disciplines are most likely to use design thinking.

Research Design and Methodology

This section describes the research design and methodology, sample, instrument, and data collection and analyzation procedures. The research design for this study was a non-experimental, descriptive study, and the methodology was quantitative using survey research. Institutional Review Board (IRB) approval was obtained from all three of the researchers’ universities.

The sample was all business educators in United States’ secondary and post-secondary business programs. The sampling frame was current members of the National Association of Business Education as of July 2021. The sample size was 1,694 and 149 people responded, for a 9% response rate. Participants were sought by emailing the NBEA membership a short cover letter and link to the survey in August 2021, followed by one reminder email three weeks later. Participants were asked not to take the survey a second time if they had already taken it. The instrument was pretested with five secondary and post-secondary business educators who were not members of NBEA, and these participants were asked to confirm question clarity and the

amount of time it took to complete the survey. Feedback from the pre-test respondents was used to make changes to the survey.

The Qualtrics electronic survey tool was used to collect data, and both Qualtrics and Microsoft Excel were used to analyze the data. The purpose of both research questions was descriptive, meaning it asked *what* or *which* questions (Gall, Gall & Borg, 2007), so the statistical analysis followed those statistics appropriate for a descriptive research design. In a descriptive study, variables are defined and measured. For the scaled questions, a Likert scale with a scale of 1-5 was used with 1=strongly agree, 2=agree, 3=neither agree or disagree, 4=disagree, and 5=strongly disagree. Cronbach’s (1951) alpha was calculated for the scaled questions and was found to be 0.92, which is an excellent internal consistency for descriptive survey research. Descriptive statistics including means, frequency distributions and percentages were developed from the data.

Discussion

Results

Results were analyzed for each research question. The first question asked: To what extent are business educators implementing design thinking in their courses?

Business educators at all grade levels were asked whether they used design thinking in at least one business and/or marketing course. At the secondary level, there were 94 respondents and 67% used design thinking in at least one course, and at the post-secondary level, there were 55 respondents and 58% used design thinking in at least one course. Of the four levels of post-secondary educators sampled, a majority of educators of bachelor’s degrees (68.4%), and master’s degrees (66.7%), use design thinking, while design thinking is being used by fewer educators of associates degrees (50%), and trade/vocational educators (46.2%).

The sample was also asked why they do not use design thinking in their business and/or marketing courses and the overwhelming majority (61%) for both secondary and postsecondary business educators was that they have a lack of knowledge about design thinking (see Figure 1). Fewer educators responded that they had a lack of time, lack of administrator support, lack of resources, or that it is not a priority.

Figure 1

Main Reason to Not Use Design Thinking

Reasons	Secondary		Post-Secondary	
	n	%	n	%
Lack of knowledge about design thinking	19	61%	14	61%
Lack of time to develop curriculum	5	16%	3	13%

Lack of administrator support	2	6%	1	4%
Lack of resources about design thinking	2	6%	0	0%
Other	2	6%	3	13%
It is not a priority for me	1	3%	2	9%

The sample of business educators was asked in which sub-disciplines they teach design thinking (see Figure 2 and Figure 3). At the secondary level, the top two sub-disciplines where design thinking was used was information technology (27%) and entrepreneurship (25%). At the post-secondary level, the top sub-discipline was management (20%), followed by a tie between general business (13%) and information technology (13%).

Figure 2

Secondary Courses Using Design Thinking

Course Category	Uses Design Thinking	
	n	%
Information Technology	30	27%
Entrepreneurship	27	25%
Marketing	18	16%
General Business	17	15%
Personal Finance	6	5%
Other	5	5%
Management	3	3%
Accounting	2	2%
Business Communication	1	1%
Career Development	1	1%
Business Teacher Education	0	0%

Figure 3*Post-secondary Courses Using Design Thinking*

Course Category	Uses Design Thinking	
	n	%
Management	9	20%
General Business	6	13%
Information Technology	6	13%
Business Teacher Education	5	11%
Other	5	11%
Business Communication	4	9%
Entrepreneurship	4	9%
Marketing	3	7%
Personal Finance	2	4%
Accounting	1	2%
Career Development	1	2%

Instructional Approaches

Results were analyzed for the second research question: What instructional techniques and/or approaches are being used by secondary and post-secondary business educators to teach design thinking? Given a list of instructional approaches from a review of the literature, the sample was asked which instructional approaches are being used at each stage of the design thinking process. Results are summarized for each stage of the Stanford Design Thinking Framework, which was the design thinking model upon which this study was designed.

The top instructional approach used to help students empathize was group discussions both at the secondary (18%) and post-secondary (21%) levels. For the define stage, forming a problem statement was the top instructional approach used by both secondary (52%) and post-secondary business educators (56%). For ideation, at both the secondary (13%) and post-secondary (12%) levels, brainstorming was the top instructional strategy used. However, there was a wide variety of ideation approaches used, such as group discussions (also used at the empathy stage) and storyboarding. Results for the prototyping stage were that at both the secondary (16%) and post-

secondary level (19%), demonstration (e.g. video or presentation) was the top instructional approach used during the prototype stage. Finally, making a presentation to the class was the top instructional approach used by both secondary (20%), and post-secondary (30%) business educators to test prototypes.

Reflection

Although reflection is not one of the stages of the Stanford Design Thinking Framework, reflection is a design thinking stage in other design thinking models (Lawson, 2006). Because reflection is critical to experiential learning (Kolb, 1984; Schon, 1987), it was important to discover whether business educators believed reflection was an important component of design thinking. Educators at both the secondary (97%) and post-secondary (100%) overwhelmingly agreed that reflection is essential to the design thinking process. Respondents at both academic levels also reported that the top instructional approach used to help students reflect on their design thinking project was class discussions, with the secondary level using class discussion 42% of the time and the post-secondary level using class discussion 30% of the time.

Findings

There are three findings that are based on the study's results. The first finding is that both secondary and postsecondary educators are using design thinking in a variety of business sub-disciplines. Secondary educators are embedding design thinking into information technology and entrepreneurship courses, and post-secondary educators are embedding design thinking into management, general business, and information technology courses. There is some research showing that the sub-disciplines of management, business and entrepreneurship have implemented design thinking as a teaching strategy (Dunne & Martin, 2006; Mumford, et al., 2016; Schlenker & Chantelot, 2014). Entrepreneurship education has embraced design thinking as a way to encourage student focus on creativity, innovation, and problem-solving which are skills and mindsets applicable to entrepreneurs (Linton & Klinton, 2019). Zupan et al. (2014) found that design thinking is a successful methodology for teaching entrepreneurship and improving Millennial students' entrepreneurial skills.

The second finding is that although reflection is not one of the stages of the Stanford design thinking process, business educators confirm that reflection is essential to the design thinking process. Moreover, class discussion was the instructional approach most used to foster reflection. Research has shown that discussions are a useful method of facilitating student learning. For example, some research indicates that discussion improves students' critical thinking skills (Dallimore et al., 2008; Noblitt et al., 2010). Discussion builds oral communication skills. Brink and Costigan (2015) described oral communication as either listening, conversing, or presenting, and found that employers most valued listening, conversing, and presenting, respectively, while business schools most valued presenting, conversing, and listening, respectively.

Class discussions promote oral communication skills. Business and marketing employers place a high value on oral communication skills, and it is one of the most sought skills of business graduates. Yet, many employers believe new hires have inadequate oral communication skills (Alshare, 2011; Stevens, 2005). Employers acknowledge that oral communication skills such as team discussions and face-to-face communication are important and common ways to communicate (Grant, 2004) although in more recent years electronic communication skills such

as phone and email (Coffelt et al., 2016) have become more commonplace, and thus highly valued by employers. Coffelt et al. (2016) found that employers valued all oral communication skills, and perceived interpersonal communication skills such as asking questions and having difficult conversations to be more important than presenting, listening, and team/group communication skills.

The third finding is that lack of knowledge about design thinking is the main reason business educators do not use it. It is likely that business school faculty have not been exposed to designers in either their corporate careers or their own business school education, and need to learn the design thinking mindset, tools, and pedagogies in order to implement them into business courses. Sarooghi et al., (2019) suggested business faculty could co-teach with faculty from design schools, and attend design conferences that could increase their knowledge. Additionally, teachers at all levels may need help gaining confidence and expertise in facilitating effective design thinking experiences. Lor (2017) recommended teacher training and development to help them gain the confidence and expertise needed to facilitate effective design thinking experiences.

Conclusion and Future Directions

Design thinking is a human-centered approach that draws on students to engage in innovative and creative problem-solving. Although design thinking has been researched in many academic disciplines, less is known about the use of design thinking in business education. Yet, a design thinking approach to problem-solving can promote innovation, differentiation, and a competitive advantage (Gibbons, 2016). Business and industry seek employees willing to help promote innovation and change (Wrigley & Straker, 2017). Although there have been calls for business people to have design skills (Dunne & Martin, 2006), and some sub-disciplines such as entrepreneurship have embraced design thinking, for the most part, business education has been slow to adopt design thinking.

The present study was situated in a theoretical framework of social constructivism and experiential learning and sought to discover to what extent secondary and post-secondary business educators are implementing design thinking in their courses, and the instructional techniques and/or approaches used. Findings showed that at the secondary, bachelor's degree, and master's degree levels, design thinking is widely used. Secondary educators are embedding design thinking into information technology and entrepreneurship courses, and post-secondary educators are embedding design thinking into management, general business, and information technology courses. Findings also showed that class discussion was the instructional approach most used to foster reflection, and business educators confirmed that reflection is an essential component in the design thinking processes they are teaching. This is helpful because oral communication skills, which can be fostered in class discussions, are valued by employers (Coffelt et al., 2016; Grant, 2004).

Limitations

As with most research, there are limitations to the study. While educators were asked which instructional approaches they used at each stage of the design process, responses were based on the expert opinions of the educators. The effectiveness of the approaches was not examined, nor were students asked their opinions about the effectiveness of the instructional approaches.

Bruton (2010) recommended conducting research to discover how learning takes place when design thinking is used, and research of this kind would help business educators understand why using various instructional approaches furthers learning.

The present study did not ask respondents whether their courses were in person, online, or hybrid. Since data was collected in September-October 2021, most U.S. secondary and post-secondary schools had resumed in-person learning, but had come from a period of time in 2020 and 2021 when schools shifted between online learning and in-person learning. This shift in learning models could have affected the perceptions teachers had about design learning. Additionally, data was collected during the COVID-19 pandemic, and the study's low response rate may have been due to current time constraints of educators, so generalizability to a broader population is limited. Finally, the study was a comprehensive look at design thinking in business education from middle through graduate school. It did not seek to compare secondary and post-secondary business education but instead, find out more about both of them.

Future Directions

Limitations present opportunities for future research. Research on using design thinking in online environments exists (Lloyd, 2013) but is very limited. Future research about how design thinking is effectively implemented in online and hybrid learning environments would be helpful to both the secondary and post-secondary levels of business education. Further research should also be conducted that studies whether design thinking should be applied differently to students at different academic levels.

Business education emphasizes preparing people with the knowledge, skills and aptitudes needed for college and career (Chamorro & Frankiewicz, 2019; Lynch, 2000). While the present study helps secondary business educators understand the instructional approaches educators are using to implement design thinking, it did not focus on whether design thinking prepares students for business careers. There is some evidence that corporations such as Apple, Google, and Microsoft are practicing design thinking in venues like department meetings, boot camps, and employee meetings (Mickahail, 2015) and there is also some evidence that corporations such as GM are using design thinking as a problem-solving tool (Beckman, 2017; Liedtka, 2014). While Dunne and Martin (2006) believes the business world wants managers to be designers, more needs to be understood about whether design thinking is an important skill desired by employers who hire business graduates, which industries most desire design thinking, and which jobs require knowledge of or experience with design thinking.

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