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Art Education and Design Thinking: Reflections on Students Engaging With Community Using Design
Éducation artistique et réflexion conceptuelle : réflexions sur l'engagement communautaire des étudiantes et étudiants par l'entremise de la conception

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Article abstract

The creative process has long been interwoven with art education practice. Design thinking has numerous parallels to the creative process and may be viewed as an appropriate method to encourage creative thinking in both art and design students. This observational case study reflects on two disparate challenges in which 47 students tackled aesthetic and community provocations by applying the design thinking process. Reflective consideration of the results of each 'project' provides insight into the application and value of a proposed Design Thinking framework in art and design education.

Art Education and Design Thinking: Reflections on Students Engaging with Community Using Design

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Abstract: The creative process has long been interwoven with art education practice. Design thinking has numerous parallels to the creative process and may be viewed as an appropriate method to encourage creative thinking in both art and design students. This observational case study reflects on two disparate challenges in which 47 students tackled aesthetic and community provocations by applying the design thinking process. Reflective consideration of the results of each 'project' provides insight into the application and value of a proposed Design Thinking framework in art and design education.

Keywords: Creativity; Design thinking; Innovation; Community.

Introduction

This paper details an observational study designed to assess whether creative thinking could be developed through employing a design thinking framework to generate potential solutions to community problems. Two separate groups of students were involved in the study to add richness to the data students learning when using the Design Thinking framework. The focus of the study was to determine how this approach could be used in art education, which is strongly linked to creativity (Graham, 2015; Roege & Kim, 2013; Thomas, 2019; Ulger, 2019, Zimmerman, 2009; 2015). The student groups in the study were in an undergraduate art education class and at a college business class, which allowed for observations of the development of creative problem-solving amongst students both in art and also in classes that were not focused on art learning. The data thus provided a broader view of creative problem-solving development.

Creativity in Art Education

Zimmerman (2009) proposed that "reconceptualizing contemporary notions about creativity in visual arts education should be an important issue in art education today" (p. 382). Although, the statement was written eleven years ago, there is still room for building our understanding of creativity as it relates to art education. There is agreement that creativity has a place in art education (Katz-Buonincontro, 2018; Sawyer, 2017; Ulger, 2019; Zimmerman, 2009) and that creativity is important (Kinsella, 2018; Stone, 2015; Veon, 2014; Zimmerman, 2009, 2015). At the same time, commonly accepted creativity myths can hamper efforts to develop student creativity in art still exist (Cropley, 2018; Stone, 2015).

From the outset, it is difficult to increase student understanding of creativity without a clear sense of what creativity is. Developing a definition of creativity has been elusive and remains a topic of debate (Silvia, 2018) although there is some consensus that to be creative something must be both novel and appropriate (Amabile, 2018; Cropley, 2016; Goetz Zwirn & Vande Zande, 2015;

Kaufman & Baer, 2012; Plucker, 2018). Amabile (2018) extends this concise definition and says that the idea of appropriateness is different in art and that "work is generally considered creative if it is novel and expressive of something, evoking a reaction (or range of reactions) in observers that the artist intended" (p. 1). Pariser (2015) offers his own definition of creativity as "the capacity to identify a problem and then to use imagination, skill, knowledge, empathy, and intuition to arrive at a novel and effective solution" (p. 109). A further refinement to the definition of creativity proposes the addition of "in context" to novel and appropriate (Baer, 2018), and this refinement is useful in art education because it supports the classroom art context. Stone (2015) discovered, however, that the art teachers in her study had conflicting perspectives on creativity and postulates that this pointed "to possible inaccurate knowledge and the fact that, in general, there is not a consensus about the definition of creativity overall" (p. 96). Stone's work was echoed in a separate study by Rubenstein and colleagues (2013), who found that in addition to conflicting definitions of creativity, teachers also displayed variation in their understanding of how creativity can be taught.

One common myth about creativity is the belief in the power of inspiration. Creativity research has shown that creativity needs to be learned, practiced, and developed (Amabile, 2018; Baer, 2016; Cropley, 2016; Cropley, 2018; Kim, 2019; Levenson & Hicks, 2015; Plucker, 2018; Ulger, 2016; Veon, 2014; Zimmerman, 2009). Baer (2016) emphasizes the fact that creativity can and should be taught and that it takes practice. The point is that "creativity is a sophisticated mindset that needs to be consciously taught, learned, and developed no less than the complex mindsets needed in other intellectually challenging disciplines" (Veon, 2014, p. 20). Veon's assertion is both a positive note and a challenge because valuing creativity means that it is necessary to provide students with skills to allow them to reach their creative potential. All students have the capacity to develop their creativity through practice as they learn to seek out and express their ideas (Levenson & Hicks, 2015).

This is not to suggest that we blindly dive into creativity development as the sole focus of art education, rather it is worth considering that increasing student capacity to engage in processes that support their development of creative solutions is a meaningful addition to their art studies. Gude (2013) cautions against training students to "generate 'creative solutions' to problems without first considering whether these problems are poorly formulated to address real needs or desirable outcomes (p. 39). With this caution in mind, the Design Thinking framework developed for this study asks students to work empathically with community. Learning to generate creative ideas is not seen as an end in itself but as a cyclical process with input from many sources.

Design Thinking and Art Education

Although it may seem that a stage model, such as the Design Thinking framework, is antithetical to creativity and art making, the history of creativity research is filled with references to the four-stage model of the creative process initially posited by Wallas in 1926. As Lubart (2018) explicates the nature of the creative process, he defines it as as a sequence of thoughts and actions that comprise the production of work that is creative. Defining the creative process as a sequence indicates that it encompasses a series of events that occur over time and likely have an end point (Lubart, 2018). Botella's (2018) discussion of the creative process from an art perspective details six stages. These stages are: idea or vision; documentation and reflection; first sketches or initial models; a period of testing the forms; creation of provisional objects or drafts; and evaluative judgements (p. 55-56). Through this lens, it is understandable that the intent of the Design Thinking framework that the students used in this study aligns with the stages of the

creative process in art making and is therefore one viable means for them to learn to develop ideas for their art. The Design Thinking framework detailed here provides one potential approach that teachers can use as they help students develop workable methods for enhancing their creativity.

Botella (2018) notes that artists working through the stages of the artistic creative process do not always work in a linear fashion and that "there are many feedback loops and a movement of 'back and forth'" (p. 66) as they create. Gude (2013) cautions against a sole focus teaching creative process in the absence of teaching "core artistic behaviours that are associated with the capacity of the arts to re-make perceptions" (p. 38). As students learn to use the Design Thinking framework to generate novel approaches, they are encouraged to follow it carefully with the understanding that as they internalize the value of each step, they can move through the process much more fluidly and use it to contribute to their creative endeavors without being tied to a formula. Additionally, the design thinking process presented here supports the balance of divergent and convergent thinking that is necessary in creative development (Baer, 2018; Onarheim & Friis-Olivarius, 2013) and it works in concert with learning artistic behaviours.

A notable similarity between the creative process and design thinking is that they both involve the generation and evaluation of ideas (Ellamil et al., 2012). Thus, because a design thinking process can be internalized as an approach to innovative problem solving, it can promote artistic creativity precisely because it encourages use of the stages that have been shown to exist in creative thought and actions. This process can also support creativity because it reinforces the habits of mind that promote divergent thinking aligned with critical reflection (Harrington & Chin-Newman, 2015; Skaggs, 2016). Providing this experience is valuable because Baer (2016) asserts that creativity can be taught successfully if it is taught in the context of content. Students can use the structure provided by design thinking as they approach idea generation in art class.

Teaching Creativity

Encouraging students to believe that internalizing a process will actually increase their creativity contradicts commonly held misconceptions about creative inspiration. Students need to learn that creativity typically arises after extended effort and disciplined inquiry (Brinkman, 2010; Gardner & Weinstein, 2018; Levenson & Hicks, 2015; Renzulli, 2018; Veon, 2014, Zimmerman, 2009). As students learn to approach art and design challenges by employing the Design Thinking framework, they develop useful tools to further their creative idea generation.

Introducing students to participatory or co-design can also encourage the interplay of ideas that strengthens their learning and thinking. Blomkamp (2018) suggests that definitions of co-design should recognize that it is a design-led process as this "indicates that it is a methodology for innovation" (p. 732). The term co-design is the shortened form of cooperative design, which grew out of the participatory design movement. Now, the two terms are often used interchangeably (Thamrin et al., 2018). Participatory design was considered radical when it emerged in the 1970s because it was democratic and assumed that those who would be affected by design decisions should be involved in the decisions (Blomkamp, 2018). Manzini and Rizzo (2011) point out that the designer's role in the participatory design process is not only to provide 'specificity' of design knowledge but also to act as mediator and facilitator (p. 200). This highlights the fact that co or participatory design does not downplay the ideas of the designer/artist but rather considers and builds on the artist/designer's ideas in order to create an end result with greater impact.

From a design perspective, co-design involves "a change from designing for users to designing with users" (Lee et al., 2019, p. 431). This is not to suggest that there are multiple artist/designers involved in decision making because participants with no training could be limiting. Involving participants in problem-structuring activities, however, allows designers to

expand their design ideas (Lee et al., 2019). Sanders and Stappers (2008) refer to co-design as collective creativity and this is a nice way to conceive it in the classroom and thereby encourage art students to seek out feedback as they work. The centrality of co-design in the Design Thinking framework, therefore provides the foundation for teachers to foster creativity in students.

Design Thinking Framework
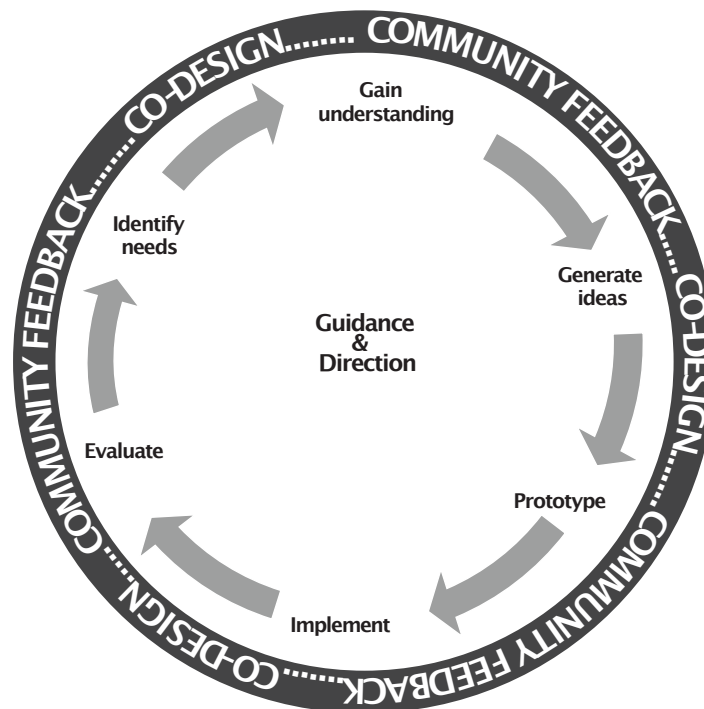
Figure 1

Design Thinking Framework

Figure 1 shows the Design Thinking framework proposed for this study. It is intended to incorporate the entirety of the design context. Design Thinking frameworks are often presented as a series or list of steps. Nussbaum (2011) explains that the concept of a process increased the popularity and adoption of design thinking. "Companies absorbed the process of Design Thinking all too well, turning it into a linear, gated, by-the-book methodology that delivered, at best, incremental change and innovation" (para 4). However, to the practice of design, design thinking is "… scaffolding for the real deliverable: creativity" (Nussbaum, 2011, para 6). Consequently, those who employ design thinking emphasize that the process is iterative (i.e., IDEO), or alternatively, the framework is presented as different 'spaces' in the design thinking context with each of the spaces potentially being revisited (i.e., Stanford d school). The framework proposed for this study uses a circular format capturing the iterative aspects of design while giving educators a clear process that can be applied in a classroom environment. Within the circle of steps, there is no clear beginning or end but rather a continuous cycle. Although each step in the cycle is

important in encouraging design thinking, the cyclical depiction of the steps emphasizes that each step has value. It also doesn't indicate a beginning or end to the process, but rather encourages a continual application of design thinking.

As the framework is intended to be applied by educators who are facilitating the learning and practice of design thinking as a support for creative ideation, it incorporates the educator in the center of the cycle providing guidance and direction. This places the educator as a guide in the learning and practice of the design thinking process. The human centered intention of design thinking is captured by encasing the entire cycle in community feedback and co-design. This also recognizes that user feedback and input should permeate all steps of the design process and echoes Pariser's (2015) inclusion of empathy in his definition of creativity.

The individual steps within the circle of the framework are consistent not only with traditional design practices and other design thinking frameworks but also with many elements in creative process models. Identifying needs and gaining understanding is termed 'discovery' in the linear IDEO framework (IDEO, 2020) and 'define' in the Stanford d school model (Shanks, n.d.). In all of these frameworks, the intention of this phase is to encourage empathy between users and designers. Gasparini (2015) explains "in a Design Thinking process all the participants in a design team need to be empathic with the users they are designing for in order to create relevant solutions" (para 14). Gasparini (2015) further identifies the difference between cognitive empathy and emotional empathy citing that both are important to the design thinking process. Cognitive empathy is based on understanding of users' needs whereas emotional empathy is feeling what others are experiencing. The focus on creating empathy is intended to escalate the designer's gathering of information beyond more traditional methods of consumer research (i.e. focus groups difficult and complex problems. Difficult and involved problems are complex and there is often no simple method of solution. There is growing evidence that design thinking is particularly suited to addressing these types of ambiguous problems (Brown & Wyatt, 2010; Jobst & Meinel, 2014; von Thienen et al., 2014). At the same time, by encouraging empathy, design thinking expands the development of the traditional creative brief and incorporates a human-centric approach (von Thienen et al., 2014).

Generating ideas and prototyping are the next two steps within the circle of the framework. During the idea generation stage, diverse methods of thinking such as brainstorming are encouraged to simulate innovation and generate multiple creative solutions (IDEO DT Toolkit, 2020). Critical thinking and convergent thinking are used to select the most promising ideas to explore and advance further (IDEO DT Toolkit, 2020). The intention is not to select and develop one idea, but to try multiple ideas and follow through with the most promising to the prototyping stage. Rapid prototyping (i.e., quickly moving from an internal idea to an external physical form) facilitates the testing of differing solutions and provides an opportunity for problem solving (Brown & Wyatt, 2010). As Gasparini (2015) explains, "the rapid prototyping act in the Design Thinking process, provokes small advancements based on partially known information, and the outcome is a high quantity of results one can further analyze" (para 8). Prototyping, thus, encourages further analysis and facilitates co-design by enabling users to provide their input and feedback on partially implemented solutions. This emphasis on the user in the design thinking process is particularly valuable to complex design challenges that "… tend to generate negative or undesirable consequences for the user, and it can be difficult to know these before the implementation of the solution" (Worward & Plucker, 2017, p. 91).

Implementation and evaluation are the final steps in the framework. The cyclical format of the framework facilitates the notion that the design process is never completely done. In the IDEO

design thinking process, this final step is termed 'evolution,' also capturing the idea that design is a continually evolving process.

It is also worth considering that as with any new skill, design thinking must be learned and then practiced. It takes practice in the form of study, time, effort, and repeated rehearsal for the skill to become so internalized that performance is automatic (Speelman and Cowan, 2005) whether that be learning to solve a calculus problem or pull a successful intaglio print. This observational study recorded both how students engaged with the Design Thinking framework and its impact on their creative idea generation while they used a new problem-solving method. The observations were also used to record how this impact might be different for business students compared to art education students.

Research Methodology

This two-site study employed qualitative observational research methods. Observations were recorded by the researcher instructors using the steps in the Design Thinking framework to structure and compare groups within and across classes. Observations included the ability of the students to apply each of the design thinking steps including direct and indirect observation of challenges and successes encountered by the students at each step of the project, observation of interactions between students and community and instructor evaluated performance measures. This added a measure of validity as the observations occurred in two sites and were recorded by two researchers who were able to compare and discuss their findings across different measures (Angrosino, 2011). The goals of the research were to develop a baseline understanding of student adoption of the Design Thinking framework while also increasing our understanding of both the challenges and successes students encounter while learning to use the framework to solve problems.

The two classes included in the study were purposefully selected with one class representing post-secondary students enrolled in non-art business classes and the other class representing art education students. Both classes were asked to complete art and design challenges for social innovation. The comparison between the two groups was intended to provide a richer exploration of how the Design Thinking Framework could be used by students to foster creativity.

The observations were structured because, as part of the classroom setting, the activity in which the students engaged was posed as a specific course task and the Design Thinking framework acted as the "framework of predefined actions" (Leicht et al., 2010, p. 77). Although the observations were structured, the data was entirely qualitative consisting of written narratives for each step on each measure by the instructors. Success using the Design Thinking framework was not tied to grades or other quantitative outcomes and the observations focused on how the students handled the implementation of the framework. The adoption of a co-design approach and the guidance and direction provided by the educator were also observed, critically reflected on, and evaluated.

Participants

The study was conducted in two classes: one at a college business class and the other at an undergraduate art education design class. The participants were students in the two classes and their involvement arose both because they were registered in the classes and gave permission to be observed. The classes were in different institutions in different geographical locations, but each class presented the students with an opportunity to use the Design Thinking framework to address

a social innovation challenge. Additionally, one student group was enrolled in a business program and the other student group was in an art education class.

Observations and Discussion

<u>Business Program Observations</u>

The first observation example is drawn from the consideration of two student groups participating in an international service learning (ISL) course that included travel to an African country. This example of design thinking being used to address social innovation challenges provides two very clear and contrasting outcomes that can be analyzed with respect to the effectiveness of the Design Thinking framework as it relates to education, and as a tool to instill processes of creative problem solving. Because the students followed the Design Thinking framework, they were encouraged to employ both divergent and convergent thinking and thereby develop their understanding of the value of balancing the two in creative ideation (Cong, 2018; Onarheim & Friis-Olivarius, 2013). In this case, creativity was evidenced not only in the application of design thinking to produce novel or divergent potential approaches, which is an element of creativity in art education (Ulger, 2019) but also in the 'reflection, documentation [and] consideration of constraints" (Botella, 2018, p. 68).

<u>Sample and Project Description:</u>

The student groups who participated in the ISL course were comprised of 3rd and 4th year college students. Prior to the ISL course, the students were given the description of two challenges (needs) identified in two different villages. One was to provide clean drinking water and the second was to bring light into houses and classrooms. The students were required to explore the proposed challenges by doing some initial background research. Ideally, this step in the Design Thinking framework employs both cognitive (understanding) and emotional (feeling) empathy, so to assist with this step, both groups were provided with access to village leaders prior to their travel experience to discuss the users' needs further.

<u>Observations:</u>

The student group assigned to address the clean drinking water challenge identified a number of specific characteristics of the village and its current access to water when gathering background information. The students undertook research on different approaches to providing clean water and during their research and discussion with the village leaders, the students identified several potential solutions as well as several other issues that needed to be addressed. This exploration of issues encouraged the students to expand their thinking beyond just a clean water solution and they generated multiple combinations of creative potential solutions that addressed the needs that they had identified. This group embraced and demonstrated divergent thinking which is a component of the creative process (Acar & Runco, 2017; Botella, 2018; Johnson et al., 2019). The outset of this process also underlines the students engaging in the practice of identifying a problem and using knowledge, imagination and empathy (Pariser, 2015) to arrive at a solution.

The student group then started to build prototypes of clean water filter systems. They also prepared basic hygiene training flashcards using information they had researched and redesigned to create graphic handouts to fit with the information they had been given about the villagers. Finally, prior to leaving for Africa, they organized a group of people from the village to assist with building the first two biosand water filters to ensure there was an understanding of the building

process and maintenance requirements. When the students arrived in the village, the plan was effectively implemented and after two years, the biosand water filters were still operational. This example demonstrates an effective implementation of the design thinking process. After choosing and identifying a problem, and deepening their knowledge, the students engaged the villagers in co-designing the clean water filter system. By speaking with the village leaders, the students were also able to address challenges that were initially unforeseen and generate creative solutions for addressing these potential obstacles echoing Skagg's (2016) assertion that creativity is expressed more as obstacles mount. The Design Thinking framework provided a structure that stressed the importance of continuing to seek solutions while also supporting students as they strove to generate more ideas. After following each step in the Design Thinking framework, and by engaging in divergent thinking, and innovative problem solving, a solution was implemented that successfully and creatively resolved the initial need.

The group who chose the problem of unlit houses and classrooms were not as successful in recognizing the importance of divergent thinking/brainstorming or engaging in the empathic element of creative ideation. This group did undertake background research prior to their discussion with the village leaders, but the outcome of this research was less about understanding the problem and more about finding an immediate solution. The focus on finding a quick solution counters the intent of creative idea generation because it avoids brainstorming and searching for novel ideas. Instead of exploring, the students settled immediately on the 'Liter of Light' (literoflight.org) which is a bottle solar light system that had been successfully installed in villages in India and was expanding to marginalized communities in other countries. The early adoption of a defined solution by the students was based on only a minimal application of cognitive empathy and a complete lack of emotional empathy. It also highlights the importance of ongoing support for students who fear the potential for failure or mess when experimenting (Pariser, 2015). The students truncated the process once they fixed on their ready-made solution and avoided critically reflecting. Even discussions with the village leaders did not encourage diving more deeply into idea generation. In an attempt to stimulate more innovative ideas, guidance and direction was given by the instructor to do more research, and although the students then explored other options, they did not change their direction and decided to continue with the Liter of Light project. The student group built a prototype prior to leaving and confirmed the system worked in a classroom environment in Canada. On arrival, the students encountered several issues. Most limiting was that the villagers were uncomfortable putting holes in their walls and ceilings to install the water bottle solar light system. The villagers were also not confident with the system and didn't see the potential in the water bottles. Consequently, the students were not able to install a single Liter of Light system other than one small demonstration in an unused hut. The failure of this project is evident in the lack of willingness to experiment widely, generate ideas empathically, or think critically throughout the process. This can also be seen as superficial attention to the steps of the Design Thinking framework.

Findings:

The two different approaches used by the student groups on the first ISL course underscore the merit of internalizing the purpose of each step in the design thinking process while understanding the intent of each element. One group successfully navigated the cycle and used the framework to scaffold their experimentation, critical reflection, and empathic understanding whereas the other group failed to recognize the value of divergent ideation, thoughtful reflection and empathic understanding resulting in a simple project that lacked creativity and was

unsuccessful. Consistent with both the Design Thinking framework and creativity development, this unambiguous contrast in outcomes emphasizes the value of co-design, the necessity for divergent thinking, the need for student practice, and the role of the educator throughout the application of the process, particularly if the process is being used to provide students with a scaffolded means of engaging in creative idea generation.

As an illustration of ways to support creativity these examples highlight challenges that arise in teaching students to use the Design Thinking framework. It takes practice to experiment widely and consider multiple options and it also takes some students time to develop comfort with potentially messy experimentation. In this case, the prescribed nature of the problems also highlights the distinction between applied creativity and artistic creativity (Modrick, 2015) because applied creativity puts emphasis on value-added solutions. At the same time, students in both groups were engaged in problem definition, idea generation, and prototyping, which are all processes that are connected to the development of creative capacities.

Art Education Class Observations

A second case observation comes from an undergraduate design class in an art education program in which students were introduced to the Design Thinking framework early in the course. Design thinking was included as a viable means to enhance creative idea generation and students practiced using the framework as they developed innovative design solutions in their projects.

Sample and Project Description:

Class projects were designed to provide increasing levels of student choice within course structure constraints. For each project, students were required to not only create extensive planning work in the form of research notes and thumbnail sketches of their brainstorming but also share their planning with classmates for feedback and discussion. Students were further urged to go beyond their first idea and consider novel or experimental approaches.

In the observed instance discussed here, students were asked to create an educational infographic that dealt with a social issue. They were expected to conduct research, present the issue graphically, and also present potential approaches for dealing with the issue. In addition, the outcomes of the project included the development of a: strong composition; layout that supported the ideas being promoted; colour scheme that aligned with the theme and message; and competent use of an appropriate typeface. These foci were important because the graphic elements were integral to the design learning in the course and provide a parallel to learning in art classes where developing an understanding of art processes and deepening subject knowledge is a goal. Maintaining consistency in terms of the design elements remained a focus that served to support and underline the ideas and helped students to develop a holistic understanding of the interconnected nature of creativity, concept, and image. The approach encouraged students to push beyond safe solutions and combine ideas to generate new ideas (Harrington & Chin-Newman, 2015; Levenson & Hicks, 2015; Pariser, 2015).

This project came at a juncture in the course wherein students had already been required to begin their concept work by conducting research and to use multiple thumbnail sketches in order to develop their original ideas beyond their initial concept. Students thus had practice in brainstorming and trying experimental ideas as part of their preparation for projects. They had also grown accustomed to sharing their ideas in interactive groups prior to prototyping, which in this class involved developing roughs. Because roughs are a more developed half-size image of the initial planning sketches, they act as prototypes for the proposed design. They were reminded to

extend their thinking and to research multiple viewpoints on their chosen social issue. Because of earlier lessons and projects, the students were aware that empathic attunement to audience was vitally important and they were encouraged to speak to others about their concepts.

Observations:

Students appeared to have no difficulty either choosing an issue or presenting the problems associated with the issue. While some chose fairly straightforward topics such as the hazards of smoking, many tackled issues that required increased creative ideation such as racist attitudes amongst the elderly. Student research for each project ranged from detailed and substantive to more superficial, but all engaged with the process. Students' creative willingness or lack thereof, to be open to novel experiences and challenges (Hausman et al., 2015), was highlighted by the less defined second part of the project. This underscores the need for ongoing opportunities to generate novel ideas when developing class activities to support creativity development. Students were adept at developing novel methods of presenting researched facts but shied away from generating creative ideas for addressing the issue. Many students clung to a visual rendering of the facts that they had gathered in their research and needed prompting to generate more novel approaches. Within the structure of the Design Thinking framework, however, it was readily apparent to the students that idea generation needed more focus and this helped students understand that creative approaches could be enhanced. The framework also served to alert the students to the fact that creative ideation was valued and worthy of their effort (Cropley, 2018; Hausman et al., 2015; Runco, 2018).

Findings:

From the perspective of pedagogy for creativity, this highlighted the challenge of freeing students to take risks and generate novel ideas. Some handled prototyping adeptly by critically examining the rough work they produced and using their careful reflection to implement their ideas with more success but others struggled to see the value in the prototyping process. Others shied away from extensive ideation and this tentative approach is worthy of further study particularly as it occurred in a setting that supported experimentation.

The students who did not generate multiple concepts gave cursory effort on their thumbnails and really did not push beyond their first idea. In fact, Johnson et al. (2019) indicate that divergent thinking must be highlighted in order for learners to benefit from exploring ideational diversity. This emphasizes the need to both encourage art students to generate many ideas as they begin the design thinking or any creative ideation process and also to alert them to the value of divergent thinking. Using the Design Thinking framework as a structure in the class signaled to the students that these processes were valued and therefore offered support for tackling approaches that were not assured of working (Graham, 2015; Pariser, 2015).

This also points to the value of instructor intervention at key points in the process, which echoes the understanding that creativity needs to be taught and practiced (Baer, 2016; Veon, 2014). Reflecting on the results here resulted in providing more support and clearer incentives for experimentation to a subsequent group of students. For instance, subsequent iterations of the assignment further stressed the importance of divergent thinking while also acknowledging how challenging it could be to generate multiple ideas. Ultimately, it was vital to remember that not only were the students learning a new process and needing guidance as they practiced but they also needed to be reminded that the framework was in place to provide a space for them to generate creative ideas.

Discussion and Conclusion

The findings from the observational studies suggest that there is value in applying the Design Thinking framework as an educational tool to encourage habits that support creative thinking in students. This echoes other studies (Ingalls Vanada, 2014; Watson, 2015) and aligns with Vande Zande's (2017) assertion that, "design thinking is used to stimulate creative thinking" (p. 55). It was also observed that there were some similarities between art students and general business students when applying the framework to stimulate creativity. Although it might be expected that art students would be more comfortable considering creativity, both groups demonstrated similar challenges when they were asked to take risks. This was highlighted by the use Design Thinking framework because avoidance of this step was obvious.

It is evident from the researchers' observations that students who consciously worked to internalize the steps of the framework were able to develop both novel and useful solutions thereby meeting a commonly accepted criteria for creativity (Amabile, 2018; Beghetto & Karwowski, 2019; Goetz Zwirn & Vande Zande, 2015; Hawthorne et al., 2014; Pariser, 2015; Plucker, 2018). This suggests that the framework can be a practical tool that can be used in the classroom to encourage creative thinking. The findings also indicate that the diversity and scope of potential solutions can be expanded by incorporating both emotional and cognitive empathy during the process of gaining understanding of an art or design challenge. The intentional exploration of the issues and development of multiple solutions enables students to explore ideas beyond the definition of the original need or problem. The outcomes for the students who engaged fully in the application of each step in the design thinking process were clearly more effective at addressing identified needs.

The need to engage in co-design and solicit community feedback throughout the process was also evident in both classes although the nature of the feedback was distinctly different in the two classes. Without community feedback, it was clear that although the solutions may have been novel, they were not always appropriate. This applies equally to classroom art and design projects, albeit in a different way because community in the art room is often the community of learners. Encouraging students to consider their audience empathically promotes more successful solutions that have a broader scope. Perhaps most evident from the observations was that, without the involvement of the educator in guiding and directing the application of the design thinking process, it was easy for students to skip steps and thereby undermine creative thinking and the usefulness of the outcome. This was evident amongst both business and art students.

Consequently, the Design Thinking framework proposed in this study provides a useful tool for educators who are: engaging with communities using design, striving to have their students develop creative solutions that consider a broader audience, or helping their students learn methods that enhance creativity. It presents a cohesive process for stimulating creativity with the requisite for co-design and direct involvement of the educator. This aligns with the understanding of the cultural and social nature of creativity (Graham, 2015; Hausman et al., 2015; Sawyer, 2018).

Not only does the Design Thinking framework serve as a useful tool for educators and students who are engaging with communities, but it also serves as a useful tool in the art or design classroom because it encourages creative ideation and reflection. Observations and assessment showed that, as students grew comfortable using the Design Thinking framework, they were able to generate ideas more freely and also develop better approaches for evaluating their efforts. This upholds the understanding that we not only need to teach students that they can be creative, but also teach them the tools they need to develop that creativity (Veon, 2014).

As a closing note, it is worthwhile to reflect on the value of these observations for art education and particularly in a class that is not focused on design. As Ulger (2019) says, "the visual arts student in the beginning of an artwork's production has [sic] likely to encounter non-routine problems as a new situation during each of the production stages of thinking, designing, and application in terms of the solving process" (p. 57). If art students begin an artwork facing non-routine, and often ambiguous problems, learning an approach that can help them consider "the messiness of artistic insight, cultural complexity, human need, or ethical considerations" (Gude, 2013, p. 37) as they develop creative solutions to those problems, is a worthwhile addition to their art education. Art and design are distinct in that art is often about self-expression and can rely on aesthetics alone - whereas design creates a bridge between aesthetics and function and needs to function properly to be effective (Vande Zande, 2017). However, art and design are similar in striving for a unique message and in valuing creativity. Because design thinking can help students face ambiguity while it nurtures their creativity, it can play an important role in art education.

References

Acar, S., & Runco, M. A. (2017). Latency predicts category switch in divergent thinking. *Psychology of Aesthetics, Creativity, and the Arts*, *11*(1), 43–51. http://dx.doi.org/10.1037/aca0000091

Amabile, T. (2018). Creativity and the labor of love. In R.J. Sternberg & J.C. Kaufman (Eds.), *The Nature of Human Creativity* (pp. 1-15). Cambridge University Press. https://doi.org/10.1017/9781108185936

Angrosino, M. (2011). *Doing ethnographic and observational research.* Sage Publications Ltd. https://dx.doi.org/10.4135/9781849208932

Baer, J. (2016). Creativity doesn't develop in a vacuum. In B. Barbot (Ed.), Perspectives on creativity development. *New Directions for Child and Adolescent Development*, 151, 9–20.

Baer, J. (2018). The trouble with "creativity." In R.J. Sternberg & J.C. Kaufman (Eds.), *The Nature of Human Creativity* (pp. 16-31). Cambridge University Press. https://doi.org/10.1017/9781108185936

Beghetto, R.A. and Karwowski, M. (2019). Unfreezing creativity: A dynamic micro-longitudinal approach. in R.A. Beghetto & G.E. Corazza (Eds.), *Dynamic perspectives on creativity: New directions for theory, research, and practice in education* (7-26). Springer. http://www.springer.com/series/13904

Blomkamp, E. (2018). The promise of co-design for public policy. *Australian Journal of Public Administration*, 77(4), 729-743. https://doi.org/10.1111/1467-8500.12310

Botella, M. (2018). The creative process in graphic art. In Lubart, T. (Ed.). (2018). *The creative process: Perspectives from multiple domains.* Routledge. https://doi.org/10.1057/978-1-137-50563-7

Brinkman, D.J. (2010). Teaching creatively and teaching for creativity. *Arts Education Policy Review*, 111, 48-50.

Brown, T. & Wyatt, J. (2010). Design Thinking for Social Innovation. *Stanford Social Innovation Review*, *8*(1), 30-35.

Cropley, A. (2016) The myths of heaven-sent creativity: Toward a perhaps less democratic but more down-to-earth understanding, *Creativity Research Journal*, *28*(3), 238-246. https://doi.org/10.1080/10400419.2016.1195614

Cropley, A. (2018). Bringing creativity down to earth: A long labor lost? In R.J. Sternberg & J.C. Kaufman (Eds.), *The nature of human creativity* (pp. 47-62). Cambridge University Press. https://doi.org/10.1017/9781108185936

Ellamil, M., Dobson, C., Beeman, M., Christoff, K. (2012). Evaluative and generative modes of thought during the creative process. *NeuroImage*, 59, 1783–1794.

Gardner, H. & Weinstein, E. (2018). Creativity: The view from big C and the introduction of tiny c. In R.J. Sternberg & J.C. Kaufman (Eds.), *The nature of human creativity* (pp. 94-109). Cambridge University Press. https://doi.org/10.1017/9781108185936

Gasparini, A.A. (2015). Perspective and use of empathy in design thinking. *Advancements in Computer-Human Interaction*, ACHI 2015. https://www.researchgate.net/publication/273126653

Goetz Zwirn, S. & Vande Zande, R. (2015). Differences between art and design education—or differences in conceptions of creativity? *The Journal of Creative Behavior*, *51*(3), 193–203. https://doi.org /10.1002/jocb.98

Graham, M.A. (2020) Deconstructing the bright future of STEAM and design thinking, *Art Education*, *73*(3), 6-12. https://doi.org/10.1080/00043125.2020.1717820

Graham, M.A. (2015). Boundaries, play, and the spiritual dimensions of creativity: A teacher's reflections on fashioning environments for good ideas. In F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity research and practice in art education: Foundations, pedagogies, and contemporary issues* (pp. 64-72). National Art Education Association.

Gude, O. (2013). Questioning creativity. In N. Addison & L. Burgess (Eds.), *Debates in Art and Design Education* (pp. 37-42). Routledge.

Harringon, D.M. & Chin-Newman, C.S. (2015). Making art as a creative process; The importance of imagination, freedom, and skills for artistically talented high school students. In F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity Research and Practice in Art Education:*

Foundations, Pedagogies, and Contemporary issues (pp. 141-150). National Art Education Association.

Hausman, J., Hostert, N. & Brown, W.K. (2015). Pedagogy toward a creative condition. In F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity Research and Practice in Art Education: Foundations, Pedagogies, and Contemporary Issues* (pp. 73-79). National Art Education Association.

Hawthorne, G.; Quintin, E.M., Saggar, M., Bott, N., Keinitz, E., Liu, N., Hsuan Chien, Y., Hong, D., Royalty, A., and Reiss, A.L. (2014). Impact and sustainability of creative capacity building: The cognitive, behavioral, and neural correlates of increasing creative capacity. In H. Plattner, C. Meinel, & L. Leifer (Eds.), *Design Thinking Research: Building Innovation Eco-Systems* (pp. 65-78). http://www.springer.com/series/8802

IDEO (2020). *Design thinking for educators Toolkit.* https://www.ideo.com/post/design-thinking-for-educators - https://designthinking.ideo.com

Ingalls Vanada, D. (2014). Practically creative: The role of design thinking as an improved paradigm for 21st century art education. *Techne Series A*, *21*(2), 21-33.

Jobst, B. and Meinel, C. (2014). How prototyping helps to solve wicked problems. In H. Plattner, C. Meinel, & L. Leifer (Eds.), *Design Thinking Research: Building Innovation Eco-Systems* (105-113). http://www.springer.com/series/8802

Johnson, D. R., Cuthbert, A. S., & Tynan, M. E. (2021). The neglect of idea diversity in creative idea generation and evaluation. *Psychology of Aesthetics, Creativity, and the Arts*. *15*(1), 125–135. https://doi.org/10.1037/aca0000235

Katz-Buonincontro, J. (2018). Creativity for whom? Art education in the age of creative agency, decreased resources, and unequal art achievement outcomes. *Art Education*, *71*(6), 34-37. https://doi.org/10.1080/00043125.2018.1505388

Kaufmann, J., & Baer, J. (2012). Beyond new and appropriate: Who decides what is creative? *Creativity Research Journal*, *24*(1), 83–91. https://doi.org/10.1080/10400419.2012.649237

Kim, K.H. (2019). Demystifying creativity: what creativity isn't and is? *Roeper Review*, *41(2),* 119–128. https://doi.org/10.1080/02783193.2019.1585397

Kinsella, V. (2018). The use of activity theory as a methodology for developing creativity within the art and design classroom. *International Journal of Art & Design Education*, *37*(3), 493-506. https://doi.org/10.1111/jade.12147

Lee, J., Ahn, J., Kim, J. and Kho, J. (2019). Co-design education based on the changing designer's role and changing creativity. *International Journal of Art and Design Education, 38*(2), 430-443.

Leicht, R.M., Hunter, S.T., Chitwan, S., and Messner, J.I. (2010). Implementing observational research methods to study team performance in construction management. Journal of *Construction Engineering and Management*, *136*(1), 76-86.

Levenson, C. & Hicks, D. (2015). Opening the door: Teaching toward creativity. In F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity Research and Practice in Art Education: Foundations, Pedagogies, and Contemporary Issues* (pp. 100-108). National Art Education Association.

Lubart, T. (Ed.). (2018). *The creative process: Perspectives from multiple domains.* Routledge. https://doi.org/10.1057/978-1-137-50563-7

Manzini, E. & Rizzo, F. (2011) Small projects/large changes: Participatory design as an open participated process, *CoDesign*, *7*(3-4), 199-215. https://doi.org/10.1080/15710882.2011.630472

Modrick, J.E. (2015). Connecting artistic creativity and applied creativity. In F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity research and practice in art education: Foundations, pedagogies, and contemporary issues* (pp. 51-56). National Art Education Association.

Nussbaum, B. (2011, April 5). Design thinking is a failed experiment. So what's next? *Fast Company*. http://www.fastcodesign.com/1663558/design-thinking-is-a-failed-experiment-so-whats-next.

Onarheim, B. & Friis-Olivarius, M. (2013). Applying the neuroscience of creativity to creativity training. *Frontiers in Human Neuroscience, 7*(656), 1-10. https://doi.org/10.3389/fnhum.2013.00656

Pariser, D. (2015). The limits of social constructionL Promoting creativity in the visual arts. In F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity Research and Practice in Art ducation: Foundations, Pedagogies, and Contemporary Issues* (pp. 109-115). National Art Education Association.

Plucker, J.A. (2018). It all makes sense now that I think about it: A quarter-century of studying creativity. In R. J. Sternberg & J. C. Kaufman (Eds.), *The nature of human creativity* (pp. 166-183). Cambridge University Press. https://doi.org/10.1017/9781108185936

Renzulli, J.S. (2018). The malleability of creativity: A career in helping students discover and nurture their creativity. In R.J. Sternberg & J.C. Kaufman (Eds.), *The nature of human creativity* (pp. 209-223). Cambridge University Press. https://doi.org/10.1017/9781108185936

Roege, G. B., & Kim, K. H. (2013). Why we need art education. *Empirical Studies of the Arts*, *31*(2), 121–130. https://doi.org/10.2190/EM.31.2.EOV.1

Rubenstein, L.D., McCoach, D. B. & Siegle, D. (2013) Teaching for creativity scales: An instrument to examine teachers' perceptions of factorsthat allow for the teaching of creativity. *Creativity Research Journal*, 25(3), 324-334. https://doi.org/10.1080/10400419.2013.813807

Runco, M. A. (2018). Authentic creativity. In R. J. Sternberg & J. C. Kaufman (Eds.), *The Nature of Human Creativity* (pp. 246-263). Cambridge University Press. https://doi.org/10.1017/9781108185936

Sanders, E. B. N. & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign, 4*(1), 5–18. https://doi.org/10.1080/15710880701875068

Sawyer, R.K. (2017). Teaching creativity in art and design studio classes: A systematic literature review. *Educational Research Review*, 22, 99-113.

Sawyer, R.K. (2018). An interdisciplinary study of group creativity. In R.J. Sternberg & J.C. Kaufman (Eds.), *The Nature of Human Creativity* (pp. 280-290). Cambridge University Press. https://doi.org/10.1017/9781108185936

Shanks, M. (n.d.). *An introduction to design thinking: Process guide.* Retrieved June 16, 2021 from https://web.stanford.edu/~mshanks/MichaelShanks/files/509554.pdf

Silvia, P.J. (2018). Creativity is undefinable, controllable, and everywhere. In R.J. Sternberg & J.C. Kaufman (Eds.), *The Nature of Human Creativity* (pp. 291-301). Cambridge University Press. https://doi.org/10.1017/9781108185936

Skaggs, P.T. (2016). Rethinking design thinking: Applying the four Ps of creativity. *The International Journal of Design Education*, *10(*2), 9-17, https://doi.org/10.18848/2325-128X/CGP/v10i02/9-17

Speelman, C.P., Cowan, E., Kirsner, K. (2005). *Beyond the Learning Curve: The construction of mind*. Oxford University Press.

Stone, D.L. (2015). Art teachers' beliefs about creativity. *Visual Arts Research*, 41(2), 82-100. Thamrin, D., Wardani, L.K., Hasudungan, R., Sitindjak, I. & Natadjaja, L. (2018). Experiential learning through community co-design in interior design pedagogy. *International Journal of Art and Design Education*, 38(2), 461-477. https://doi.org/10.111/jade.12208

Thomas, K. (2019). *The paradox of creativity in art education: Bourdieu and socio-cultural practice.* Palgrave MacMillan. https://doi.org/10.1007/978-3-030-21366-4

Ulger, K. (2016). The creative training in the visual arts education. *Thinking Skills and Creativity*, 19, 73–87. https://doi.org/10.1016/j.tsc.2015.10.007

Ulger, K. (2019). Comparing the effects of art education and science education on creative thinking in high school students, *Arts Education Policy Review*, 120(2), 57-79. https://doi.org/10.1080/10632913.2017.1334612

Vande Zande, R. (2017). *Design education: Creating thinkers to improve the world*. Rowman & Littlefield.

Veon, R.E. (2014) Leading Change: The art administrator's role in promoting creativity. *Art Education*, *67*(1), 20-26. https://doi.org/10.1080/00043125.2014.11519254

von Thienen, J., Meinel, C., & Nicolai, C. (2014). How design thinking tools help to solve wicked problems. In H. Plattner, C. Meinel, & L. Leifer (Eds.), *Design Thinking Research: Building Innovation Eco-Systems* (97-104). http://www.springer.com/series/8802

Wallas, G. (1926). *The art of thought*. Harcourt Brace.

Watson, A.D. (2015). Design thinking for life. *Art Education*, *68*(3), 12-18. https://doi.org/10.1080/00043125.2015.11519317

Worward, M. & Plucker, J.A. (2017). Domain generality and specificity in creative design thinking. In F. Darbellay, Z. Moody, & J.A. Plucker (Eds.), *Creativity, design thinking and interdisciplinarity* (83-97). Springer. https://doi.org/10.1007/978-981-10-7524-7

Zimmerman, E. (2009). Reconceptualizing the role of creativity in art education theory and practice. *Studies in Art Education*, *50*(4), 382-399. https://doi.org/10.1080/00393541.2009.11518783

Zimmerman, E. (2015). Bridging the gap between creativity research and practice in art education. F. Bastos & E. Zimmerman (Eds.), *Connecting: Creativity Research and Practice in Art Education: Foundations, Pedagogies, and Contemporary Issues* (pp. ix-xiv). National Art Education Association.