Creative Pedagogy in an Undergraduate Creative Design Course

Discussions around Instructor Interviews

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Creative thinking in design is a focus of PK-12 technology and engineering education. Pre-service STEM teachers from The College of New Jersey in the United States of America are required to take a course, Creative Design, as an integral part of their degree sequence. Additionally, Creative Design is a liberal learning course which fulfills a Literary, Visual, and Performing Arts requirement, and is therefore open to all students. The course is extremely popular, with approximately nine sections running each semester. Originally conceived in the 1960's, topics covered in Creative Design include the design process, design thinking, technical drawing, design elements and principles, and human factors engineering (ergonomics). This study adopted a qualitative research design to explore if and how instructors of Creative Design employ creative pedagogy. The research question driving this inquiry was; how and in what ways are instructors of Creative Design using creative pedagogy in their classrooms? Four Creative Design instructors from The College of New Jersey were interviewed for this study. Open-ended questions allowed for deeper exploration of participants' views and opinions. Thematic analysis was used to generate themes and gain a holistic understanding of participants' use of creative pedagogy. Themes emerged such as open-ended problems, collaboration, and creative self-efficacy that were well aligned with research-based practices in design education.

Keywords: Creativity, Undergraduate, Engineering, Design, Pedagogy

Introduction

Student capacity in creativity has been of interest to the technology and engineering education community for over a century (Warner & Gemmill, 2011). Technology education teacher preparation programs in the United States have engaged future teachers in coursework related to creativity and creative capacity in design and innovation (Denson, Buelin, Lammi & D'Amico, 2015; Huffman 2017; Jones & Wright, 2018). Technology and engineering education instructional activities often involve design-centric activities with a focus on students developing solutions to ill-defined, authentic real-world problems. These experiences provide a rich platform for the teaching of creative processes such as curiosity, divergent and convergent thinking, and empathy as well as encouraging students to believe in their own creative identities (O'Brien, 2012). In order to effectively develop and deliver instructional materials with the goal of building creative capacity, pre-service teachers should experience creative instruction as part of their preparation program. To this end, pre-service teachers from The College of New Jersey in the United States of America are required to take a course, *Creative Design*, as an integral part of their degree sequence. Additionally, *Creative Design* is a liberal learning course which fulfills a Literary, Visual, and Performing Arts requirement, and is therefore open to all students. The course is extremely popular, with approximately nine sections running each semester. Originally conceived in the 1960's, topics covered in *Creative Design* include, but are not limited to, the design process, design thinking, technical drawing, design elements and principles, and human factors engineering (ergonomics). While a popular course, little is known about how the sections, taught by various instructors, differ with concern to creative pedagogy.

Creative Teaching and Creative Pedagogy

There are a number of factors that may influence a teacher's ability to teach creativity. Personality, thinking style, career experiences, teacher knowledge, and environmental factors most likely play a role in an instructor's capacity to teach creativity (Horng et al., 2005). Of the factors that influence a teacher's ability to teach creativity, creative pedagogy is the most likely to be improvable. As described by Lin (2009), creative pedagogy includes three fundamental and interrelated elements; creative teaching, teaching for creativity, and creative learning. In order to better develop and deliver courses such as Creative Design, it is important to understand the instructors' beliefs about how they implement creative pedagogy. The intent of this work is not to dictate or critique instructor practice. It is simply to attempt to better understand the types of creative pedagogy being implemented by instructors. Professional development, instructional materials, and shared resources could then be developed to support instructors in their delivery of Creative Design.

Methods

This study adopted a qualitative research design to examine how instructors of Creative Design employ creative pedagogy. Adapting a phenomenology lens this study recruited participants through convenient sampling at the institution in which the researchers are employed (Creswell & Poth, 2018). The research question driving this inquiry was; how and in what ways are instructors of Creative Design using creative pedagogy in their classrooms? Four Creative Design instructors were interviewed for this study, which received approval from the institution's Institutional Review Board. After signing an informed consent document to participate in the study, participants were interviewed one-on-one by one of the researchers in their office. Interviews varied in duration, ranging from approximately ten to thirty minutes. Open-ended questions allowed for deeper exploration of participants' views and opinions. Thematic analysis was used to generate themes and gain a holistic understanding of participants' use of creative pedagogy.

Participants were asked a series of questions related to creative pedagogy in their Creative Design classrooms. Before each question, participants were given a prompt that included a definition of the terms used in the questions (Amponsah, Kwesi, & Ernest, 2019). The prompts and questions used in the interviews are included in Table 1.

Table 1. Interview prompts and questions.

Question #	Prompt	Open-ended Question
1	Creative teaching is defined as: "using imaginative approaches to make learning more interesting and effective" (NACCCE, 1999).	How do you employ creative teaching in your Creative Design classroom?
2	Teaching for creativity is defined as: "having the objective of identifying young people's creative abilities while encouraging and providing opportunities for them to develop those capacities" (Jeffrey & Craft, 2004).	How do you teach for creativity in Creative Design?
3	"Creative learning in schools is often characterised by an environment which fosters the habits of questioning and challenging, making connections and seeing relationships, envisaging what might be, exploring ideas, keeping options open, pondering on ideas, actions and outcomes. An essential feature of creative learning is that it focuses on the potential of each individual child" (Gomez, 2007).	In what ways do you feel you foster creative learning in your Creative Design class?

All participants received the interview questions prior to the session and were permitted to bring notes to the interview. Participants were also given the opportunity to return to any previous question throughout the interview.

Data Analysis

Each interview was recorded via a digital voice recorder and was transcribed verbatim. The researcher conducting the interviews took clarifying notes that were used to guide the initial identification of potential themes that may emerge from the data. The researchers independently reviewed the data and notes. The researchers made comments about possible common themes within the creative pedagogy framework. Following the procedure of "peer debriefing" identified by Lincoln and Guba (1983), the researchers then met to discuss the themes, synthesize similar terminology, and clarify comments as a technique to establish credibility of the data.

Results

Key themes emerged from the collected data from each question. Some themes seemed to extend beyond the scope of the individual questions and pertained to all the questions holistically. We have included commentary on these themes in the discussion section. For the first question concerning *creative teaching*, the theme that emerged was **open-ended problem solving**. Themes related to the second question about *teaching for creativity* were **introducing skills and strategies** and **collaboration**. Finally, the themes that emerged for *creative learning* were **classroom culture** and **creative self-efficacy**. Each of the themes is described below with reference excerpts from the interviews to add detail.

Creative Teaching

Open-ended problem solving. All four of the Creative Design instructors that were interviewed identified open-ended problem solving as a way that they employ creative teaching. Instructor #4 explained that this idea of open-ended thinking is prevalent throughout their course, in everything from discussions to projects to exams:

> I never ask a question that has a right or wrong answer. Whether it's in class or on a test or anything. Everything is open-ended.

Instructor #3 spoke about the open-ended nature of the projects throughout their class, particularly discussing how various levels of open-endedness can challenge students in different ways:

> ...a lot of my projects...are very open-ended, so open to interpretation. Some of the projects they are allowed to bring in materials from home which allows them to see the fact that I'm willing to allow them to shoot for the stars and be very creative with it. And then certain projects on purpose they have a limited list of resources which presents its own set of problems or, you know, things that they have to work through.

Instructor #1 described the "kick-off" project in their class, in which students are tasked with designing an accessory for their cell phones. Instructor #1 describes this first challenges as one that:

> ...give[s] students that quick experience of quick problem solving where there's not one right answer...

Although Instructor #2 did not explicitly discuss open-ended problem solving during their interview, it was clear that they employ this strategy in their classroom, as evidenced by the way they discussed utilizing the design process:

> ...the basis of this course is more about the hands-on, learning the design process, and then kind of different aspects that add to their knowledge to be able to [explore] the design process in an efficient and an effective manner.

Teaching for Creativity

Introducing skills and strategies. All interviewed instructors discussed ways of introducing skills and strategies to their students. Instructor #4 discussed this in a broad sense, as an overall goal of the course:

> They need to be able to think like college students...we need to present them with enough strategies that they can take information, organize it in such a way to come up with a logical thought, then express the thought visually and textually.

The majority of the instructors spoke about brainstorming strategies that they employ in their classes. Instructor #1 identified morphological matrices as a strategy that they teach, as well as a multitude of other hands-on skills:

> ...by giving [students] different skills that help them put their creative ideas out there and organize them, that's a big part of it, right? Along with that, tools and machines skills, materials, and their properties, or materials processing, the more stuff I can give you exposure to the more you have in your repertoire to design with.

Instructor #1 also emphasized the idea that creativity and brainstorming skills are valuable across disciplines and career paths:

> ...by us engaging in this creativity stuff, it's not just for designers...this is a way to think and act towards life and towards problem-solving, and I'm here to give you the skills, so halfway through the semester we can start using those skills to engage in the design process.

Instructor #2 considers which skills and strategies to teach, and thoughtfully integrates them into design projects throughout the semester:

> With each of the design projects I try to do something that hits on a skill...or a way of thinking about things. And also I try to in some ways mimic real-world scenarios that are going to have constraints...things that they need to consider and think about...

This instructor also puts particular emphasis on brainstorming strategies:

> ...as far as teaching for creativity, I try to encourage different ways to think outside of the box, whether that be through sketching, just quick brainstorming, tricks and activities...mind maps or webs and things like that...just really try to be creative and not think about, 'what's something I've already seen before.'

Along with Instructor #1, Instructor #3 spoke at length about utilizing morphological matrices as a brainstorming strategy:

> I teach morphological charting. Which is where they create a chart to express their brainstorming of ideas in a verbal way even before they do a design sketch. Because once again, they aren't coming from a design background oftentimes, so they don't know how to brainstorm besides having some kind of very verbal or word-based method. So it does help as a progression to teach them that approach...

Collaboration. Only half of the interviewed instructors discussed how they fostered opportunities for collaboration in their classrooms. Instructor #1 talked specifically about the importance of teamwork and how it applies to the real world:

> ...we do little activities, quick ones, that illustrate different engineering habits of mind. Where they can step back from the activity and look at how they're engaging and see that the importance of communication, technical writing or speaking or listening, the importance of collaboration… if you're not able to have these habits of mind and work in a team, you're not going to create the patents.

Creative Learning

Classroom culture. Three out of four instructors spoke about the importance of an open, welcoming classroom culture, in which students felt comfortable sharing their creative ideas. Instructor #3 focused on making sure their students understand that there is no "wrong" answer when it comes to creative

endeavors:

> ...having them learn right from the beginning that this is a class that's unlike any class you've ever had where there is no right or wrong, and trying to create an environment for them where they realize, I'm not judging their creativity. I'm trying to help them explore creativity. So, you know, just having that comfortable environment where they know I'm never going to look at something that they created and shoot them down or make them feel bad...if anything I'm like their cheerleader encouraging them...

Similarly, Instructor #2 emphasized that there are no bad questions:

> It does come down to relationships and making sure that students feel comfortable, that they feel open to being able to talk about different thoughts that they have that they're not going to be shut down like right away like, oh that's a silly question.

Instructor #1 hoped to convey to their students that the classroom is one where students should not feel embarrassed or intimidated when sharing their thoughts:

> I give them warm and cold feedback prompts about how to deliver warm and cold feedback, these prompts like, 'I wonder if you thought this'...And we'll go up to give critiques and I'll be like, 'don't stop. Keep going.' 'It doesn't sound– it's uncomfortable.' 'I know, just keep going, we're not– no one's here to make fun of you.' And I put that up as a value. As a valuable skill.

Creative self-efficacy. An essential aspect of creative learning is creating an environment in which students grow, both in knowledge and self-efficacy. Three instructors spoke about creative self- efficacy in their classes. Instructor #1 related a story of a previous student who was struggling creatively, and how that struggle was necessary for growth:

> The rest of your life anytime you encounter something you're gonna look at it and go, I've done that before. Because that's where true self-confidence comes from. And you only be[come] confident when you create, which means you've been tested before…true confidence comes from being tested. [That] awareness...that has exponential power.

Instructor #3 spoke generally about how they observe students' creative confidence evolve throughout the course of a semester:

> ...I see a lot of kids really grow throughout the semester where they were a little timid and not sure of themselves, that as they essentially with each project practice and develop and build that confidence in themselves to, you know, step out of their comfort zones...

Finally, Instructor #4 offered this comment on creativity and creative growth:

> ...you don't search for the creativity in a person. You develop the creative ability within a person.

Limitations

There are several limitations to this study. First, the participants were reporting on what they believe they delivered in terms of creative pedagogy. This data is limited in that the participants' instruction might not actually match their beliefs. Second, this study is limited only to the instructors interviewed and may not represent all of the creative instruction received by students in other coursework. Finally, the utility of this study is limited to one institution and the institution's uniqueness may make the findings difficult to compare to similar institutions.

Discussion

It is evident that instructors of Creative Design believe that they implement creative pedagogy. Several of the themes seem to align with topics championed in design instruction research. For example, the theme of open-ended or ill-defined, "wicked" problems has been used as an instructional strategy in the design education community for decades (Buchanan, 1992; Coyne, 2005; Rittel & Webber, 1973). Furthermore, the participants discussed several characteristics of "wicked problems" as identified by

Buchanan, such as no clear "yes or no" answer and the uniqueness of the problem. The same could be deduced about the themes concerning the importance of collaboration (National Academy of Engineering, 2004; Smith, Sheppard, Johnson, and Johnson, 2005), skills and strategies (National Academy of Engineering, 2004; Strimel, Grubbs, Huffman & Bartholomew, 2018), and creative self-efficacy (Huffman, 2017; Tierney & Farmer 2002). The similarity between the participants' responses and topics of interest to the design education research community suggests that the instructors have been prepared, at least to some extent, to deliver research-based design instruction.

While themes emerged that were relatively similar across the instructors, it was also evident in the data that the instructors deviated greatly when it came to student projects and possibly student outcomes. Future research would aim to investigate how these differences may influence the effectiveness of an instructor's creative pedagogy and how some projects may be better suited for a creative classroom than others.

Further research could seek to validate the beliefs the participants had about their creative pedagogy. Data could be collected from course syllabi, instructional materials, student surveys, or lesson videos. Additional research could also seek to identify courses at institutions with similar learning outcomes in order to compare best practices.

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