



How Creative Mindset Operates with Respect to Creative Performance: Pedagogical Factors that Ignite Creative Mindset in Design Education

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Abstract. This research investigated college design students' mindset for the "decision to be creative" when they have a design project in front of them; moreover, this research investigated factors that influence students' creative mindset and how educators enhance creative mindset to students. In order to address these purposes, a qualitative triangulation was used. The major findings of this study provide a number of important implications for improving pedagogical strategy, utilizing the concept of the creative mindset within a design education context. Moreover, this study provides directions for future research regarding the creative mindset in design education and suggestions for expanding this study to contribute to other disciplines that is needed creative thinking.

Keywords: Creative mindset · Design education · Higher education · Pedagogical strategies · Decision to be creative · Design process

1 Introduction

Researching people's mindset in terms of creativity is important because their mindset play a critical role in the affection of their positive attitude. Creative performance usually starts with a positive attitude toward the creative process. A mindset is a particular way of thinking, tendency, or habit. People tend to start something from their own perspective and come up with ideas that are novel and useful in some way. This tendency to develop creative work originates mostly from the decisions that people make. People have the willingness to discover ambiguity, overcome obstacles, and find ways to do the necessary work before executing creative performance.

According to the investment theory of creativity, creativity is a decision similar to that of investment:

...to be creative is to invest one's abilities and efforts in ideas that are novel and of high quality, and one must, like any good investor, *first decide to generate new ideas, analyze these ideas and sell the ideas to others...* People are not born creative or uncreative. Rather, they learn and develop a set of attitudes toward life that characterize those who are willing to go their own way [1].

The main purpose of this research is to gain knowledge regarding the relationship between design students' creative mindset (decision to be creative) and their attitudes that motivate them to engage in design work creatively.

I believe that students' positive attitudes, such as willingness and curiosity, can be explained by intrinsic motivation. For example, curiosity is defined as "a desire to know, to see, or to experience something that motivates exploratory behavior directed towards the acquisition of new information" [2]. The drive theory of curiosity refers to a person's cognitive and perceptual coherence, which can become disrupted by novel, complex, or ambiguous stimuli. By learning and gathering new information about related stimuli, it is possible to restore cognitive and perceptual coherence [2]. Put differently, curiosity toward stimuli facilitates one's willingness to *decide to act*.

This conception of intrinsic motivation can be applied to the creativity domain in design education. Indeed, intrinsic motivation can explain what a student's driving force is in being creative, and how he or she uses it for his or her design in order to be more creative. According to Amabile [3], intrinsic motivation arises from the individual's perceived value of engaging in the work itself. People seldom work creatively without really enjoying it versus obtaining possible rewards. Intrinsic motivation makes people become interested in something that they want to know more about; consequently, it makes them more likely to act upon their thoughts. A creative process starts with finding and formulating a problem [4]. In other words, people should be willing to solve problems and should be curious about such problem, as well as the solutions. By using these overarching ideas of investment theory and intrinsic motivation, I define the creative mindset as *the decision to be creative*.

Research involving students' mindsets in regard to the decision to be creative in an educational context is very important because one's attitude toward life reflects his or her willingness to follow his or her own way, which can be learned and developed. Generally, spontaneous attitudes appear in the process of creative work; furthermore, it has been found that people do their most creative work when their motivation is intrinsic rather than extrinsic. In this case, people care about what they are doing, and not just about what they will eventually end up with. In other words, they have a learning goal orientation: involves mastering new things, not a performance goal orientation: based on measuring ability [3, 5]. The learning goal orientation concept is subset of a growth mindset theory. This theory explains people's beliefs regarding their psychological traits and abilities, which plays an important role in influencing their own motivation and behavior [5]. People who believe that their abilities are able to develop and change. The current study aims to establish the fact that the growth mindset concept can be applied to the creative mindset in design education. As a result, design students can develop their creativity.

2 Method

Research focused on *design students'* decisions and implicit beliefs about creativity is very rare. Although this study is based on existing theories of creativity, mindsets, and student behavior, the main purpose of this study is to gain knowledge in regard to examine creative design students' states of mind (thinking styles), the creative mindset,

and design students' acts of creative performance. An additional aim of this study is to establish factors that motivate students' creative mindset in design educational context. Thus, grounded theory is a part of the research tools in this study, given that this research seeks and conceptualizes latent design students' thinking patterns, relating them to growth mindset concept. The main challenge of this study is related to the nature of the educational environment, as well as to students' individual thinking styles and mindsets on creativity and their performance. These factors are complex: they represent situational change processes, and they are multifaceted and multi-actor in nature. Thus, qualitative triangulation was employed.

2.1 Participants and Setting

Developing the creative mindset is an important value of an educational goal, particularly in design education. For this reason, design students were selected as the participants of this study. Because a training period was involved in using the design tools, and because experience in doing design projects led to a greater likelihood of affecting students' performance and design outcomes, undergraduate design students were the unit of analysis for this study. There were three phases in the process of the study, which were as follows: a growth mindset (toward creativity) test, direct in-depth interviews, and observations.

2.2 Growth Mindset Test

Using existing measurement of creative growth mindset [6–8], the test was conducted to identify students with a high growth mindset toward creativity. The sample for the test consisted 179 students who agreed to participate in this research. The students were enrolled in a variety of design subject matter tracks, such as graphic design, architecture, interior design, product design, and apparel design in a couple of different major universities located in the US Midwest. These students were selected from two introductory-level design classes and two advanced-level design classes.

2.3 In-depth Interview

When the test was completed, 12 participants with a high growth mindset were selected to continue to the interview phase. A qualitative data collection method was used with in-depth interviews consisting of open-ended questions to identify participants' implicit beliefs about creative mindsets (decisions to be (more) creative) and factors to enhance their creative mindset. The interviews were designed to collect descriptive data in the participants' own words and to develop an understanding with regard to participants' opinions and experiences. The interviews took approximately one hour each. All interviews were recorded and transcribed; moreover, the interview situations were documented in field notes. The data were analyzed through an inductive content analysis, in which "themes and categories emerge from the data through the researcher's careful examination and constant comparison" [9].

2.4 Observations

Throughout the entire research process, participant observations were conducted to examine their behavior/performance and outcomes of the creative design process. To enhance the validity of the observation data, the observation took four months (one semester) in two different design studio classes that were selected for phase 1 (the tests). Two classes were visited within two time periods (4 h) a week during the entire semester. The observations were made when the participants were given a new project and time to work on their own. In this way, the relationship between participants' creative mindsets (decision to be creative) and creativity (developing their project) in the design process could have been observed through their behavior. To analyze the field notes, (1) the collected data were organized into a narrative format of a day; (2) the narrative format of the information was organized, according to the outline of the research questions; and (3) a deductive content analysis was used, which "starts with the counting of words or manifest content, then extends the analysis to include latent meanings and themes" [9]. The outlined text information was analyzed to determine the frequency of the contents (students' habits of action). This information was later compared to the research objectives and interview findings to match with students' performance and the creative mindset.

3 Results

1. Making an effort to have new experiences and to get external stimuli helps one's motivation to be (more) creative. 100% of the students reported that creativity more or less depends on effort. Ten out of the 12 participants actually used the word "effort" in their interviews, and two participants gave examples to show how they make an effort to be more creative. Participants make an effort to have new experiences, since they believe that a creative outcome is based on an individual's experience. Participants' motivation to develop more creative ideas comes from external stimuli (experience). During the interviews, all of the participants shared their experiences. They said that these experiences triggered their motivation to engage in creative activities. The participants below said that they make an effort to expose themselves to new environments, such as going out to see nature, museums, traveling, meeting friends, and getting a new hobby. They also try to observe their surroundings from different perspectives and from breaking things down and reconnecting them in order to redefine something new. Participant 11 said that she believes an individual's experiences shapes one's creativity, especially experiences involving failure stimulate her to become more creative.

Participant 1: I think I try to make quite a bit of *effort in being more creative*. When I feel that I need new ideas, I go out to a new environment. I tend to just take inspiration from anything I see and look at it from a design perspective. Nature, design websites, furniture, architecture, etc. and just breaking down its form, color, balance, shape, etc. I think noticing these details helps me be more creative in my designs.

Participant 2: ... The *effort helps me be more creative* because I am actively observing other objects and trying to find ways in which I can apply that to my designs. I definitely think creativity levels can differ, based on effort in trying to be more creative. I think lesser creative people just take art and design as it is and don't try to find creative solutions or innovations.

Participant 4: I have noticed that going to museums and places where art and design live is something that always inspires new ideas and projects for myself. *Making the effort to just surround yourself with others works and sometimes gives me the push to start something new.*

Participant 6: I think *there is always a bit of effort needed when starting a new hobby*, but nothing over the top. I usually do low-level research to make sure I have a comprehensive idea of what something will take, and then I do it on my own. The process of figuring it out is where the creativity is reignited...making the hobby or new activity my own.

Participant 10: I naturally take *my effort to find good ideas in my everyday lives*. I observe and find things to connect to each other and mix them together to create something new. It happens when I walk, meet my friends, travel, and even lie down to sleep. I think that my creativity is based on my research. All of my experience can be research because I have a habit of journaling what I feel, see, hear, and read.

Participant 11: The ability to explore creative ideas depends on what kind of experience you have had. *Your experience shapes your creativity...*In my case, creative ideas come from my experts and things that I have already experienced, especially a failed experience. Challenges stimulate my creativity... It should be fueled by curiosity and a drive to be experimental and to try to do new things—either new to yourself or to the world. Even though it's not easy, trying to embrace failure is another part. Those who are innovative often fail the first, second, third (and so on) time.

Participant 5 makes an effort with a little different perspective. This participant said that he has high creativity, but sometimes external factors, such as negative habits, hinder his creativity. Thus, he makes an effort to overcome these negative habits and temptations to help himself become more creative.

Participant 5: I seek out other people's perspectives on what I'm working on and remove myself from digital temptations. If you have negative habits that disrupt your flow, making the effort to overcome them can help you be "more" creative... Overall, *I think that creativity can be less or more, depending on your effort.*

Participant 7 did not mention the word "effort" in the interview. Rather, she said that the activities in which she engages to maintain her own creative process mainly involve looking for external stimuli, such as critiques, attending collaborative events, and image-based research from social media sites.

Participant 7: I consciously (and sometimes unconsciously) search for inspiration in my environment. I also love all of those image-based social media sites like Pinterest, Behance and Dribbble. I can't say no to looking at pretty things, but those sites also come in handy for inspiration searching or finding new styles to try. Going through all of the studio courses and the critiques with that have helped my

creativity immensely. It helps to hear other peoples' opinions, plus learning from instructors. You also learn how to expand and hone in on your own creative process. I also enjoy attending collaborative events like workshops and conferences. I've have learned so much from those, and it has maintained my curiosity.

2. *Education plays an important role for students in having a creative mindset (real-world problem-based learning, opportunities to support peers' creativity).* The participants said that studio classes motivate their creative mindsets. Because a studio class mainly focuses on experience-based learning (creating things with their performance), it usually leads to their spontaneous project process. They plan, research, ideate, sketch, and make their projects. This process makes them think creatively. Ninety-two percent of the participants shared their experiences from design studio classes, and they are mostly motivated by the types of design projects.

The first type of project is one that has clear and specific goals to apply to a real situation. This type of project motivates students to actively engage in the project. This positive attitude enhances their creativity. Participant 5 discussed a project about building environmental graphics and a wayfinding system. This project was intended to create cost-effective and visually effective solutions for an inside space in a design department building that the participants use every day.

Participant 5: We redesigned a wayfinding system for a space in the building where we work every day. The building is an outdated old facility. My research and design could be a proposal for redesigning the building later. It makes me excited to do the project. I did a survey with the students and professors who use this building to know their needs. I felt that this process motivated me to be more creative because my design could reflect people's needs, as well, and has the potential to be used to improve our environment.

The second type of project is an assignment with an interaction between teaching and learning. This was a great opportunity to hear unexpected stories about interactions between teaching and learning. The participants said that interactive support is very helpful in being creative. Motivation to be creative comes not only from an instructor's support (lectures, feedback), but also the participants' own support of others.

Participant 6: ...One of the team projects was to conduct research on an assigned historic era from Design History. Our team had to create presentation material containing many visual references and historic information. And then we had to give a lecture to the class using the material. After we finished the lecture, we did a workshop for other students to create artwork using an art style from the history lecture. Our charge for the workshop was to encourage students to make artwork "creatively." It was interesting to think about strategies that we can employ to help someone be creative. And I was fascinated to see the growth of the students... I was able to expand my thinking and figure out how to make their artwork better, which I think was really hard. But I think that really helped. I think that it improved my creativity.

The third type of project is a project requiring constructive critique, which involves specified instructions on how to give feedback. The participants reported that the

constructive critique process makes them have an open mind in terms of accepting others' critiques. Also, it gives the participants confidence to give their feedback to others, since there are guidelines. At the same time, there is a chance for the participants to think about their own design. In this way, they are positively challenged by the critique process. Students are encouraged to be more creative when they have chances and options.

Participant 11: Before I had the critique, I didn't even know how to say, or what to say to others' work. I sometimes said, "I like the color." "I like the way it is used in your design"... But I know that this can't help others develop their designs. We had a constructive critique for our 4th project. We were in groups of four. Our group had to give feedback to the whole class. The professor gave us a sheet with a list containing a bunch of items. The items tell where and how to look at others' designs and ways to give a feedback (at least one suggestion to improve the design, and at least one comment of what and why it is good). At first, our team discussed the design based on the list on the feedback sheet, wrote our comments on the sheet, and moved on to the next design. Once we finished the critique and came back to my design, my feedback sheet was full of helpful comments. This whole process made me think about how to make others' work better, and this thinking process gave me a chance to think about how my design can be better. I actually came up with a better and pretty creative idea for my design while I was doing this critique.

4 Discussion

During the interviews with the high creative growth mindset students, they shared their experiences of when they were motivated and felt encouragement to engage in creative performance. The most common aspect of motivating their creative mindset was an instructional activity and/or experience that encouraged them to have an open mind and to be intrinsically motivated. Learning is a process by which students engage in activities (actively doing something), such as discussion, participation, hands-on workshops, or problem-solving that promote students' interest, enjoyment, and curiosity in their learning.

1. Active learning focused on what they "actively do"

In the interviews, common opinions consistent with active learning were found from the study participants. The participants reported that creativity is an activity intended to find new, innovative challenges that change a situation for the better. They also reported that creativity is not merely about a new product (outcome); rather, creativity is a process by which a person comes up with something new. They said that a design studio class, as opposed to a large lecture class, motivates their creative mindset. Because a studio class is mainly focused on creating things using the design process, it usually leads to their spontaneous activity to create outcomes. They plan, research, ideate, sketch, and make their projects. This process makes them think creatively. Basically, all of the participants have had positive experiences in design that required hands-on skills. This made them more likely to consider choosing design as their major. Due to this characteristic of design students, a course with opportunities to

do practical projects and *participate* in real-life experiences will be more likely to motivate their creativity. Participating in real-life experience through design works, such as real-world problem-based projects and community-based work, would allow students to generate ideas and would encourage them to move forward in their creative projects. This kind of course, such as a design studio course that adopts a real-world problem-based project, requires a step-by-step process to solve problems. A creative mindset is involved during this process. The students said that every single time a new project was in front of them, they asked themselves how they could execute the project more creatively. Also, the active learning process makes students more likely to spontaneously plan and lead their projects so that their choices are applied at every step.

2. Opportunity to support a peer's creativity

An interaction between teaching and learning fosters a creative mindset. The meaning of "teaching" here indicates helping and supporting someone to be creative, while "learning" indicates receiving someone's support and encouragement in order to be creative. The participants said that a peer's engagement and encouragement, such as feedback, less negative criticism, more acceptance of diversity, and allowance for failure all motivate them to be more creative. Moreover, while they attempt to figure out how to make others' projects better, it enables them to expand their own thinking. Thus, the interaction between teaching and learning positively impacts an individual's creative mindset and provides them with an opportunity to support their peers' creativity while enhancing their own.

3. Relationship between external stimulation and intrinsic motivation

Clear guidelines (on how to give feedback) provide students with specific goals to develop their work and open their minds to accept others' critiques. Based on the participants' experiences, receiving only praise for their work and having the ability to engage in the design process do not foster motivation or lead to creative accomplishments. They were able to give the most effective and helpful feedback when they have guidelines of where to focus on others' work, what to comment on, and how to make others' work better. This way of giving comments encourages students who get feedback to be more creative (willing to develop).

Intrinsic motivation, which is strongly related with a creative mindset, arises from these external stimuli, such as teaching and learning relations, unrelated events, loose but constructive ways of learning, and unconventional ways of approaching problems. Students said that a loose, but constructive learning environment gives them the freedom to think about and do things; in this way, they are positively challenged. They are encouraged to be more creative when they have chances and options. Using unconventional ways of approaching problems is fun and enjoyable for them. These students feel that their creativity is tapped when they are involved in unstructured situations. They believe that the most creative ideas come from unrelated events. From students' reports of unrelated events, it is evident that they develop creative ideas when they are engaged in something different from the problem that they need to solve (e.g., talking with friends about a TV show, driving a car while traveling, daydreaming, eating food, etc.).

5 Conclusion

The major finding of the study could provide a number of important ways to improve pedagogical strategy, utilizing the concept of the growth mindset within a design education context. First, the factors that contribute to a student's creative mindset will contribute to developing a better design curriculum by integrating real-world problem-based projects and community-based works. Second, instructional factors can help educators set goals for class activities, such as giving students an opportunity to support their peers' creativity and setting constructive guidelines for critiques in the design process. Third, knowledge about the relationship between the creative mindset and the concept of the growth mindset will help educators create an instructional environment and situation that can ignite students' creative mindsets, such as unconventional ways of approaching design problems and introducing unrelated events. Particularly, creating a good atmosphere for the first impression of a project is important in leading students' creative mindsets, since the creative mindset involves students' attitudes toward the design project at the beginning stage. Also, the growth mindset is always involved in the process of creative thinking. As a result, educators can take advantage of situations in which students might express unexpected and surprising ideas. From this situation, educators praise the process and effort of creative thinking more than the outcome/creative ability, which is very important in encouraging students' intrinsic motivation.

Recommendation for future research is that interdisciplinary collaborations could be made, since the result could be implemented in other disciplines that require high creativity or creative design thinking, such as the sciences, applied economics, and business in higher education. Furthermore, the concept from this study could be undertaken among professional designers, who are experiencing different states of mind in different types of projects to see how these professional designers maintain their creative mindsets. Also, it would be interesting if this study could be broadened to the eminent creativity area. For example, a similar study using the same criteria may be undertaken among other professionals (scientists, authors, entrepreneurs, etc.) with significant achievements, such as Nobel Prize recipients or those who have contributed to major transformations within their fields.

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