ENHANCING CREATIVITY AND PRODUCTIVITY BY CONSTRUCTIVISM APPROACH

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ABSTRACT
Creativity and productivity are just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something. It seemed obvious to the after-a while. That’s because they were able to connect experiences they’ve had and synthesize new things.
Creativity, it seems is not just purely a moment of inspiration but consists of integration of experiences and prior knowledge that leads to the synthesis of new ideas and artifacts. The Design practices has been described as engagement of a person’s integrative thinking rather than specialization (Dewey, 1929) and design is seen as liberal art with combined capabilities, skills and life experiences.

INTRODUCTION
Education and training can be effective in enhancing and fostering creativity. (Lau, Ng, & Lee, 2009; Nickerson, 1999; Ripple, 1989). The design and orchestration of creative learning experience in design education is vital in helping students develop the desired skill of a professional designer and in addition give them enough room to cultivate their creative muscles in order to prepare them for the industry.
Polytechnic, similar problems were identified. Students often have problems generating concepts; rarely going beyond the individual development and hardly progressing to the peer critique level which is critical in the designing profession. This is a severe issue as polytechnics have a role and responsibility to prepare our graduates for the workforce.
A constructivist learning environment can be the key to provide learners with meaningful, stimulating and significant learning journey that will result in problem solving. A constructivist learning environment demands a meaningful and authentic setting for social and collaborative activities to flourish. Within a project-based curriculum which we will be basing our new framework on, peer encouragement is the essential ingredient. While supporting each other, team members can become more engaged in their own learning and become active learners too. The current module format, loosely based on a Problem-based learning approach put a lot of emphasis on self and has little chance for collaboration and peer interactions.
To fully exploit the constructivist approach, Jonassen (1999) proposed that the following consideration be incorporated when designing the learning environment:
1. Conception of the problem
2. Interpretation
3. Information sources to support the understanding of the problem
4. Cognitive tools
5. Conversation and collaborative tools
The current Digital Imaging and Illustration module lacks the last three components. To complement the creative aspect of learning with the constructivist approach, we will adapt from a creative pedagogic model. In a study done by Dineen, Samuel, and Livesey (2005), it was found that this creative pedagogic model increases learners’ creativity, levels of
confidence, intrinsic motivation and acceptance of uncertainty (Dineen & Niu, 2008). The findings are consistent with other creativity literature (Amabile, 1996; Balchin, 2006; Cowan, 2006; Gale, 2001; Patrick, Hisley, & Kempler, 2000; Ramsden, 2004; R. J.; Sternberg & Lubart, 1995). The creative pedagogic model aims at focusing on process rather than outcome and requires that assessment should be a positive and diagnostic assistance to learning (Dineen & Niu, 2008). These are the eight factors recommended by Dineen et al (2005) that influence student creativity:
1. Physical environment
2. Timing and scheduling
3. Teaching style and approach
4. Teaching methods
5. Project or task
6. Assessment and feedback
7. Learner motivation and attitudes to learning
8. Prior relevant skills and prior relevant knowledge.

9. Frame of Work
The aim of this study is to foster student creativity and productivity by setting up a creatively amiable constructivist, project-based learning environment. The research question is:
• To what extent will a creative pedagogic model based on a constructivist approach be effective in fostering learner creativity?
• To undertake this study, a quasi-field experiment will be conducted. Further elaboration of this study will be featured in the method section of this paper.

Literature Review
A review of the appropriate discourse on creativity revealed that there are various definitions of the term creativity.
Creativity defined: The inherent term of creativity comes from the Latin word, creō which is to form or to create (Niu & Sternberg, 2006). The original Western notion of creation comes from Genesis where God creates and as a result many traditional artists find inspirations in that historical setting. Hence forth, the concept of Western creativity denotes originality and ingenious conception. However, in another light the Eastern interpretation of creativity is one of articulation of personal truth or individual growth (R.J. Sternberg & Lubart, 1999).
In the history of Psychologist research, Guilford (1967), the pioneering researcher was the first to distinguish between convergent and divergent thinking. According to Guilford (1950), “a creative act is an instance of learning …[and that] a comprehensive learning theory must take into account both insight and creative activity”.
According to Sawyer (2004), there are 2 types of creativity: Big C and small c. The Big C is described as something that is developed by an individual or group that is highly significant to the society, for example an invention or major discoveries. The small c is described as daily creative acts that may not have any significant societal value, for example everyday problem solving (Sawyer, 2004).
Although the spectrum of creativity seems to be wide most researchers concur with the idea that it signifies “new and useful” (Mumford, 2003). As Cox (2005) aptly put, “Creativity is the generation of new ideas – either new ways of looking at existing problems or seeing new opportunities…”

Teaching Creativity
The arguments as to whether creativity can be taught have been debated extensively. Boden (2004) posited that creativity is something that can be taught and learn and is cognitive in nature. She narrows it down to pure commitment and perseverance factor in citing the
“10,000 hour rule” by Gladwell (2008) that creativity can be nurtured (Batey, 2012; Das, 2012).

The myriad approaches in the study of creativity range from the pragmatic to the humanist to the cognitive to the psychometric. The pragmatic approach is represented by studies concerning the development of creativity (De Bono, 1971; Osborn, 1953). De Bono’s (1971, 1985, 1992) lateral thinking style, Osborn’s (1953) brainstorming all focus on developing creativity in a pragmatic but these training styles are rarely empirically tested (Chan, 2002).

The humanist approach deliberates on growth within the individual. Creativity is self as a generation of personal identity and agency (Craft, Jeffrey, & Leibling, 2001). Rogers (1961) positioned it as manifestation of man’s tendency to actualize himself and release his potential. It is viewed as paradigm-shift from the little c to the big C (Craft, 2001a). It suggests creativity, as an inherent potential that can be fostered through a supportive, student-centered nurturing learning environment (Gale, 2001).

The cognitive approach deliberates on mental representation and processes (Finke, Ward, & Smith, 1992; R.J. Sternberg & Davidson, 1995; R.J. Sternberg & Williams, 1996) emphasize that metacognition is an important part of the creative thinking process. Imparting designers with the knowledge of exploring their cognitive processes systematically will strengthen their metacognitive skills. Through this, designers can learn to apply different strategies with full knowledge of when, where and why. With such understanding, designers can think on their own two feet and trace their success or failures through a succession of steps, adding on new knowledge to their existing ones (Hargrove, 2012).

The psychometric approach was started by Guilford (1952) who believes that creative activity is like any learned skills, can be acquired amidst within some limitation by heredity. In his approach he applies longitudinal studies where creativity in individual is examined (Kim, 2006; Torrance, 1974). Guilford (1975) asserts that “the student be taught about the nature of his own intellectual resources, so that he may gain more control over them”. Later variations of Guilford’s work can be found in the Torrance test of creativity (Torrance, 1966, 1974).

The psychometric approach can also be reflected in Epstein’s (1996) study of Generativity Theory which builds on behavior and developing skill. Epstein (1996) argued that creative thinking can be nurtured. The process involves: Capturing, Challenging, Broadening and Surrounding. Capturing involves the task of documenting ideas which can be in the form of a sketch book or via laptop or ipad. Challenging is the phase whereby frustration and pain is part of the development process. Broadening involves exploration and fact finding to widen the scope of individual knowledge. Surrounding comprises of the environment or company in which the creative individual seeks to associate.

Sifting through the various creative theories and various approaches, creative education can be contemplated based on the following aspects. Firstly, the teaching aspect, which looks into the ways to deliver creative practices which kindles the development of multiple intelligence (Guilford, 1952; E.P. Torrance, 1963). The second aspect looks at the environment factor, which helps to stimulate learners’ interest and motivation (Collins & Amabile, 1999; Woods & Jeffrey, 1996) and creativity (Craft, 2001a; Esquivel, 1995; E. P. Torrance, 1995). The third aspect is about teacher’s beliefs, which include an openness and receptivity towards creative ideas.

The underpinning theories of creativity reflect succession of steps and processes that foster creativity. That very suggestion presents disparity in what creativity is all about. The freedom to express and thinking outside the box instead of processes and procedures. The autonomous ingredient seems to be absent. Recent studies by Kangas (2010) suggest that creative playfulness is essential in creative learning. The freedoms to express and room for imagination to take place (Craft, Cremin, Burnard, & Chappell, 2008) are all crucial ingredients in fostering creativity.
Recently, famed Youtube international artist and architect, Hong Yi conducted a workshop for new students at Nuova Accademia di Belle Arti Milano (NABA) two weeks before the start of the Bachelor of Design program. NABA is an Arts and Design Academy in Italy, renowned both as an Art and Design school as well as an innovative art and cultural center. In the ‘Exchange Project’ workshop, students were asked to create a design, art piece or installation made out of items they acquired from the community. They were asked to procure the materials needed for their art from the public in Milan by giving something in return to the public. One creative endeavor was conducted on campus by a group of students. They offered free cups of coffee and cookies in return for wishes written on the cups. These ‘wishing cups’ became part of an installation piece (Hong, 2012).

This exercise was less about teaching and more about creating the opportunity for exploration, expression and imagination to take place. The creative effort was a collaborative one that involves the community and inspired by an international artist foreign to Milan. Program like this is exactly what is needed to kick start the creative juices flowing before the start of a Design program.

**Methods**

Action research has a wide range of application in the classroom context. It provides the basis for formulating sound solutions to significant instructional and learning issues (Stringer, 2008). As such, the structure of our study was based on the action research processes where data was gathered, analyzed and communicated to address our learning problem (Stringer, 2008). A quasi-experiment was carried out to find out to what extent will a creative pedagogic model based on a constructivist approach be effective in fostering learner creativity and productivity.

**Participants**

A total of 50 students from the course of Diploma in Digital Media participated in this study. Two classes of 25 with a mix of male and female were randomly picked within the course. The two classes received 15 weeks of classes and follow a similar curricula. The treatment class were conducted using the new constructivist creative pedagogic framework while the control class received the traditional teaching from their instructor without the computer supported collaborative learning.

**The intervention**

The following section outlines the differences between the two teaching models and explains the intervention. The intervention will take place over 15 sessions over the 15 weeks. The topics covered during the course will be based on existing curriculum.

**Physical environment.**

Both treatment and control group were conducted in classrooms. However, the physical environment of the treatment group was arranged in such a way that aids collaborative efforts and the arrangement were changed according to the relevance of the topic. They had full access to wireless network and their own personal laptop could also be accessed. In the control group, the class was arranged according to that of the usual computer lab, in standard rows. The students used computers in the lab with no internet connection and were solely using the computers for completion of task on Adobe Photoshop and Illustrator.

**Teaching style and approach.**

The teaching style in the experimental class was less formal and resembles a workshop instead of a class room setting. Opinions and feedbacks were encouraged both through an online platform as well as offline. Discussions were strongly encouraged during the classes. In the control class, teaching was conducted formally via the teacher playing the role of the master designer within the constraint of a studio based lab.


**Assessment and feedback.**
The assessment grades were in the form of descriptive terms for the experiment class (i.e., excellent, very good, good, adequate, poor) and comments given were diagnostic. This effort helped to remove the obsession for grades and concentrate on the reflection process. The experimental class was told that the main criterion for assessment would be their creative development, evidenced by their willingness to experiment and their openness to new ways of working.

Students in the control class were given summative, conventional graded assessments based on their finished project outcomes.

**Measurements and Procedure**
A questionnaire and focus group interviews were conducted. Both quantitative and qualitative measure were used to access the study. All 50 students from both classes were asked to complete the questionnaire after the 15 weeks.

The adapted questionnaire measures student perceptions of the effect of the two pedagogies, creative versus traditional, on their creative abilities and on related attributes such as confidence and intrinsic motivation. Participants were asked to use a four-point scale to indicate what levels they were at before and after the Workshop in relation to the seven attributes:
1. Creative ability
2. Originality
3. Quality of the work
4. Confidence in experimentation
5. Work level (quantity of work and amount of effort)
6. Motivation and commitment, and
7. Enjoyment/enthusiasm

**Conclusion and limitation**
The proposed research raises the question of the extent of effectiveness of creative pedagogic for fostering learner creativity. The issue remains a complex one as the construct of creativity is varied and is often contextualized and domain dependent. At large, creativity has been a topic that has been discussed since the nineteen century. While creativity is still hugely debated and studied, the lack of study in the teaching of creativity in Design Education is still evident.

Although action research method allows us to understand the phenomena an intimate and in-depth manner it is nevertheless a highly contextualized and discipline driven, thus not highly transferable.

While the study has its limitations, it is a peek into the doorway of our inquiry into the study of creative pedagogy in Design Study and put us a little closer to understanding the perplex issue.

**References**
Constructivist learning theory places the student at the center of the learning experience with teacher's acting as learning guides. There are some benefits from this teaching method you may want to employ in your classroom, however, there are significant disadvantages as well. Constructivist teaching places more emphasis on sensory input, something that has long been overlooked by many traditional educators. In the days of old, students were expected to sit through lectures, take notes and take tests. While some of that still occurs in classrooms, more and more educators are learning that students need to be fully involved in the learning process, using all of their senses, not just their eyes and ears. Constructivism Research Philosophy. Constructivism is the recognition that reality is a product of human intelligence interacting with experience in the real world. As soon as you include human mental activity in the process of knowing reality, you have accepted constructivism. Constructivism accepts reality as a construct of human mind, therefore reality is perceived to be subjective. Moreover, this philosophical approach is closely associated with pragmatism and relativism. Constructivism philosophy is based on cognitive psychology and its background relates to Socratic method.