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Exploring Creative Design: Concepts and Definitions

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Abstract
Design as an act related to producing an answer/solution is seen as a creative process in which the solution is constructed by developing and refining both problems and ideas together, and accordingly, transferring the design from being a routine design to a non-routine one. In this sense, design is not limited to the final outcome but also concerns how the outcome was reached. We can say, therefore, that design is not just the act of designing or the design product—it represents both conditions, and how they were conceived. However, one of the major problems with creativity is its definition, which has been developed and evolved over several decades. The aim of this research is to gain a better understanding of creativity, in addition to demonstrating its role as a natural component of the design process in order to improve design ability.
Keywords: Architecture, Design, Creative design, Routine design.

1. Introduction

Design requires both imagination and reason (Hegeman, 2008). Imagination is the thinking we do when we fantasize, it is the basis of all creative activities, and certainly creativity is the core value in every field of design. Therefore In order to clarify creativity and its role in the design process, we should first provide a comprehensive overview of its different definitions.

According to Guilford, the main ingredients of creativity are divergent and convergent thinking (cited in Hommel et. al, 2011). Divergent thinking is taken to represent a style of thinking that allows many new ideas being generated, in a context where more than one solution is correct. Moreover, efficient divergent thinking would seem to require jumping from one option to another, it is associated with the concept phase of design. In contrast, Convergent thinking would seem to benefit from a strong degree of goal-directedness that is steering and efficiently constraining the search for the right concept or idea (cited in Hommel et. al, 2011). It is a process that identifies a single “correct” answer, which is useful in the realm of analysis (Cooperrider, 2008).

2. Approaches to the definition of creativity and its role in design

One of the major problems with creativity is its definition, which has been developed and evolved over several decades. Many researchers have defined and described creativity. The literature on creativity is far too large to discuss in detail. The following part discusses creativity's definition and role in design.

Rhodes (1987) defined creativity as “the process of recognizing knowledge (general or specific knowledge), and of articulating that synthesis so that other people can understand the meaning”.

Boden (1994) defined creativity as "a matter of using one’s computational resources to explore, and sometimes to break out of, familiar conceptual spaces." But creativity might be referred to differently as indicated by Roger Schank who argued that creativity perhaps is merely “an application of a technique or a rule where one would not expect to apply it." (cited in Horowitz, 1999).

Moreover, Sergey Drabkin (1992) defined creativity ass the ability of human intelligence to produce original ideas and solutions using imagination. Within the framework of this definition, creativity in design implies the production of an original form by using imagination (Cited in Ayiran, 2008).

Based on the previous definitions, creativity may be simply defined as “the ability to generate novel and innovative ideas in an effort to solve a stated issue, situation, or problem” (Cooperrider, 2008).

Klausen noted that the standard definition of creativity is problematic and maybe in an even worse state than is generally acknowledged by creativity researchers themselves. The lack of a single widely-accepted definition of creativity is arguably due to the wide range of views on the function of creativity (cited in Richards, 2011).

2.1. Imagination and Reason

2.1.1 Imagination

Creativity as a natural component of the design process has, for example, often been characterized by the occurrence of an event called the creative leap. Cross (2001) explained the creative leap as a bridge between the problem space and solution space by the identification of a key concept in design process. This means that the creative event in design may not be so much a "creative leap" from problem to a solution as the building of a "bridge" between the problem and the solution by an idea.

Wallas, in his book "The Art of Thought", described creativity as involving four definable phases: preparation, in which the problem solver collects and organizes problem relevant knowledge, incubation in

which the problem is set aside and no intentional work on it is being done, illumination in which the solution appears as a flash of insight and finally verification of the solution (Cited in Horowitz, 1999).

Phases	Objectives	Characteristic activities
1 Preparation	Conscious attempt at solution/ Formulation Of problem.	This phase involves a much conscious effort to develop an idea for solving the problem. As we have mentioned before, design problems are rarely initially entirely clear and so much effort has to be expended in understanding them thoroughly. Accordingly, It may last for hours, days or even years.
2.Incubation	No conscious effort.	Involves no apparent effort, but which is often terminated by the emergence of an idea ('illumination').
3. Illumination	The sudden emergence of an idea.	Some writers suggest that by withdrawing from the problem the thinker is then able to return with fresh attitudes and approaches which may prove more productive than continuing his initial thought development.
4. Verification	Conscious development	In this phase, the outline idea is tested and developed.

Lawson (1997) also describes a five-stage model of a creative process. In the first insight stage, the problem is formulated. In the preparation stage, a conscious attempt is made to reach a solution. The same is done, in the incubation stage, but with no (apparent) conscious effort. In the illumination stage, suddenly an idea emerges, and in the verification stage, this idea is consciously developed to a solution.

In a similar manner Amabile and Pillmer (2011) distinguishes five stages of creative problem solving. In the problem or task presentation stage, a specific problem statement is formulated. In the preparation stage, recall of information and solution approaches that appear to be relevant to the problem at hand occurs. In the response generation stage, candidate solutions are produced whereas in the response validation stage, candidate solutions are evaluated. In the outcome stage, a favorable solution is chosen, no acceptable solution is determined, or backtracking to a previous stage occurs

From that we can say that creative ideas do not come into being out of nothing, but rather involve the restructuring of known elements, testing, and developing solutions (Horowitz, 1999).

Since creativity is expected to produce an unexpected result, this may lead us to a new concept associated with creativity, which is novelty. Boden (1994), a researcher of artificial intelligence, viewed novelty as belonging to one of two categories: Psychological Novelty (P-Novel) and Historical Novelty (H-Novel). H-Novel is an idea which has never been thought of by anyone else before, therefore it refers to judgments that are made by a culture about the novelty and worth of ideas, it occurs when someone has an idea that has not been recorded before. In contrast, P-Novel is an idea which is new to the mind in which it arose, though it may have been thought of by others before, therefore it is a cognitive notion, it occurs when a person has an idea that he or she could not have had before, and historical creativity (Warr and O'Neill, 2005).

Gero (1996) suggested that creativity is related with the introduction of something new that should lead to a result that is unexpected (as well as being valuable). Another point was made by Liu (2000) suggesting that a proposed solution can become creative only when the creative person recognizes it as being a creative result proves it to the world, and the world accepts it.

2.1.2 Reason

Creativity also involves another cognitive feature; analogical reasoning (Mougenot et al, 2007). In The previous section we explored the use of analogies in proposing solutions to design problems in the conceptual phase of the design process, And how It is generally believed that the most creative analogies are those made between the most distant domains and that analogies can be performed at various levels (functional, structural, affective…), this may take us back to Schank's definition of creativity (mentioned earlier in this section).

Whilst the previous definitions provide a possible explanation of what creativity is, they do not show us how to recognize it. So why is creativity important to design? And what is the way to recognize creativity once it occurred in a design proposal?

Mel Rhodes (1987) classified the creative studies into four categories, "The '4Ps' of creativity" :

- The creative person
- The creative process
- The creative product
- The creative press/ environment.

An often mentioned source of creativity is the combination of ideas. Boden (1994) suggested that creativity involves "recognizing analogies", "unusual juxtaposition of ideas", and "solving problems, ,

exploration and evaluation".

Boden (1994) argued that if we can identify the creative ideas generated through a (creative process), we could develop some way of 'counting' them in order to measure the creativity of an individual or group (creative person). If we consider these ideas to be the (creative product) such a measurement could identify when creativity has occurred and give some objective measure of its extent.

Gero (1996) believed that there seems to be a general acceptance of the classification of design into a routine, innovative and creative. Coyne et al (1987) stated that innovation can be characterized as a process of exploration within a defined space. Creativity, on the other hand, is concerned with exploration within a space that is only partially defined.

Similarly Gero (1996, 1997) categorized design creativity in degrees. He stated that a design process is routine if the designer knows both the structure of the design space as well as procedures for searching this space, innovative if the designer can identify only the structure of the design space, and creative if the designer knows neither. In other words, Gero considers it a routine designing when all necessary design knowledge is obtainable, innovative designing when some unexpected values become possible and creative designing when one or more new variables are introduced into the design.

Dorst and Cross (2001) stated that the creativity of the design is influenced by the design problem, the design situation, and the resources (time) available, as well as the designer's own goals. They claim that defining and framing the design problem is a key aspect of creativity, and that creative design seems more to be a matter of developing and refining together both the formulation of a problem and ideas for a solution, with constant iteration of analysis, synthesis and evaluation processes between the two notional design 'spaces'—problem space and solution space.

3. Summary

We still cannot find a single model of design that covers all the ideas and issues in design, however, in every design model creativity can be found, if not in the apparent form of a distinct creative event, then in the process of evolution of a unique one. There is no way of deciding when a design problem has been solved. Architects stop designing when they run out of time or when, or in their view, it is not worth pursuing the matter further (Lawson, 2005). It seems that creative design is not a matter of first fixing the problem (through objective analysis or the imposition of a frame) and then searching for a satisfactory solution concept. Creative design seems more to be a matter of developing and refining together both the formulation of a problem and ideas for a solution, with constant iteration of analysis, synthesis and evaluation processes between the two notional design 'spaces' - problem space and solution space. In creative design, the designer is seeking to generate a matching problem-solution pair, through a 'co-evolution' of the problem and the solution.

Therefore, we can summarize the two approaches in explaining creativity in design as: 1-creativity based on sudden insight and intuitive creative leap from a problem to a solution, and 2-creativty linked to concepts like framing, co-evolution, and conceptual bridging between problem space and solution space (Holm, 2006).

The design process, then, can be seen as a symbolic transformation and translation of an architect's experience into new meaningful content. Architects draw knowledge and import from the remembered past: they combine, abstract and distort the past through acts of imagination in order to fuel images of some possible future. In other words, designers utilize the knowledge and emotional impact contained in their memorable experiences in order to assist them in the creative design process (Reffat, 2006).

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