

# SELF-ASSESSMENT OF CREATIVITY: IMPLICATIONS FOR DESIGN EDUCATION

**Hernan Casakin and Shulamith Kreitler**

## **ABSTRACT**

This study examined self-assessed creativity and design. In particular, it analyzed the relationships of self-assessment with the level of expertise, and the grades obtained by students in the course of their academic studies, with possible implications for design education. Findings support the view that self-assessed creativity is a valid and legitimate tool for design evaluation. Understanding how students assess their own design tasks and products have important implications for design education, and paves the way for generating intervention programs to encourage and develop design creativity.

*Keywords: Factors of creativity, problem solving, design students, design grades*

## 1 INTRODUCTION

Design problem solving is a complex activity that demands expertise, as well as the unconventional use of knowledge. Design involves the existence of new problem situations, which cannot be solved by retrieving prior knowledge. Besides proficiency and knowledge, a change in the view of a new problem requires creativity. A great number of studies in design creativity dealt with the definition of creativity, the promotion of creativity in design, and the study of the personality of designers (e.g., Hanna and Barber, 2001; Candy and Edmonds, 1996). However, few investigations dealt with the assessment of creativity in design. By and large, creativity is assessed in global terms by design experts. This is often the case in the evaluation of projects carried out by students in the design studio. Design teachers and design experts are expected to share similar opinions about the level of creativity achieved by a specific design project. Nevertheless, such assessments are generally not carried out on the basis of clear parameters, or under controlled situations. In a recent study, Casakin and Kreitler (2005) concentrated on the assessment of creativity in design problem solving. The aim was to propose a framework where factors of design creativity could be objectively assessed by design experts. Nevertheless, there still remain open questions such as: (i) how students in general, and novice and advanced students in particular, perceive their own designs; (ii) what is the relationship between design grades and self-perceived creativity; and (iii) what could be the consequences of self-perceived creativity for design education.

In this study we propose a framework for analyzing self-perceived creativity in design, with implications for design education. In order to test the validity of self-assessed creativity we analyzed it with respect to a specific domain (architectural design), a specific product (the design of a museum), and specific attitudes of design creativity. After presenting a general background, an empirical research is carried out for studying

self-assessed creativity in terms of objective and measurable factors among beginning and advanced architectural students.

## 2 CREATIVE DESIGN

Csikszentmihalyi (1977) defined creativity as the faculty to communicate unusual thoughts, produce insightful judgments, make significant discoveries, and understand reality in an original way. Creativity is a primary aspect characterizing design activity. Design problem solving is considered as being fuzzy and ill-defined, and thus cannot be solved through the application of algorithms (Simon, 1981). Therefore, the production of outstanding designs embraces not only knowledge and experience, but also requires creative abilities (Cross, 1997). The creative designer is supposed to have the capability to deal with complex problems using non-routine processes (e.g. Gero, 2000). Such processes involve perceiving problems from different viewpoints in order to generate alternative and unpredictable knowledge (Suwa et al., 1999). This implies that the creative designer engages in the exploration of unfamiliar information, while trying to expand the universe of possible design solutions to new frontiers.

An important issue in the creativity literature focuses on the question of how creativity can be evaluated. A series of studies dealt with the assessment of creativity in individuals. For example Guilford (1981) defined the following four main factors of creativity: originality (statistical rarity of the responses), fluency (total number of relevant responses), flexibility (different categories of relevant responses), and elaboration (amount of detail in the responses). The major starting point of our study was the assumption that the ability of designers to explore and discover new knowledge depends a lot on the way they perceive and assess their own designs.

## 3 SELF ASSESSEMNT OF CREATIVITY

The issue of how people assess their own creativity may affect their cognitive mechanisms. For example, in the domain of statistics and writing low self-assessment of creativity was shown to have negative effects such as anxiety (Onwuegbuzie, 2000). On the other hand, high self-assessment of creativity was shown to improve the enthusiasm and devotion to work (Norton, 1994). Notably, self assessed creativity was higher among inventors than non-inventors (Bergum, 1975).

In the early 1970's a diversity of tests of creativity were conceived to assess an individual's self perception of creativity (e.g. Khatena & Torrance, 1976; Schaeffer & Bridges, 1970). Nevertheless, self-assessment has not been introduced as a genuine component of creativity. Nowadays, the status of self-assessment as a tool for the assessment of creativity has remained imprecise and controversial. Some of the reasons may be that biases such as exaggeration of both positive and negative self-perception may distort the validity of individuals' evaluation of their creativity (Paulhus & John, 1998). In essence, whether self-assessment of creativity is reliable or not is an empirical question. Evaluating the validity of self-perceived creativity as a measure of creativity may require taking into account the fact that perceived creativity is not a fixed aspect. Rather, it depends on a series of factors. For example, in the design domain it may be affected by how the designer perceives the design process under his/her emotions, attitudes, goals, motivations, experience, knowledge, skills, etc.

Learning about self-assessment of creativity has important implications for design education. In the design studio, teaching is based on cyclical trial-and-error methodology, which implies performing a task, and receiving feedback from the instructors. However, except for brief iterations with the instructor, design students

spend most of their time alone, discussing potential design issues with themselves. Understanding how students perceive and assess their own designs may play a crucial role in guiding and supporting them through the process.

#### 4 EMPIRICAL STUDY

The present study examined self-assessed creativity, and its relationship to design. It focuses on the evaluation of different attitudes and characteristics of students in regard to self-assessed design creativity. In particular, the purpose was to analyze the relationships of self-assessments with the level of expertise and the grades obtained by the students in the course of their academic studies, and to clarify the implications of the findings for design education.

##### Method:

Fifty two architecture students of architecture participated in the empirical study. They included two main groups: (i) novice students (of the 1<sup>st</sup> and 2<sup>nd</sup> years), and (ii) advanced students (of the 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> years). On the completion of the design task, all students were asked to respond to a questionnaire assessing 21 issues about the design process and the design product.

The problem assigned to them dealt with the design of a small art museum in an historical physical context. A main requirement was to present a creative design solution that considers meaningful interactions between the old Town Hall and a park. The example presented in figure 1 shows that the solution provided by the novice student was quite symmetrical and insensitive to contextual differences. In contrast, the solution offered by the advanced student tried to define a hard border towards the building area, and a more permeable edge facing the green area.

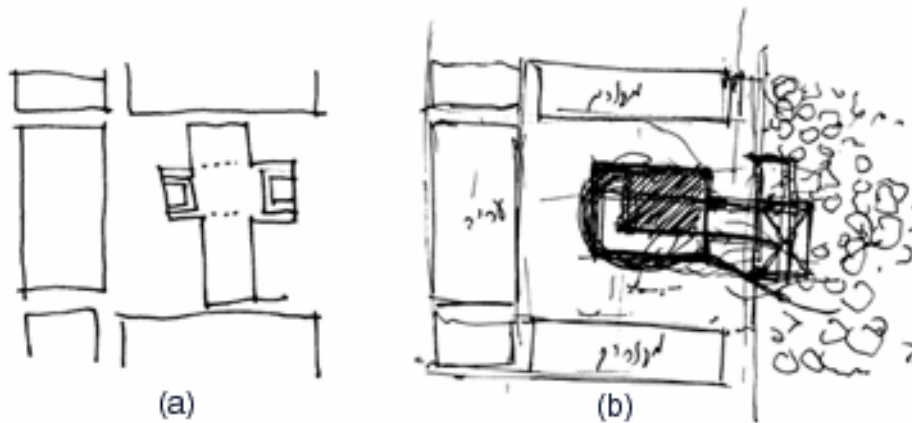


Figure 1. Example of a design solution to the museum problem by: (a) a novice student, and (b) an advanced student.

The questionnaire referred to different attitudes and characteristics of students dealing with: 1. fluency (number of design items produced), 2. flexibility (problem view from different perspectives), 3. elaboration (level of development), 4. usefulness (functionality), 5. innovation (novelty, originality) 6. fulfilling goals and design requirements, 7. considering the physical context (as a design constraint), 8. Mastery of skills (concerning the esthetics of the design representation), 9. Overall creativity (of the product), 10. Central idea, (that guided the design task) 11. Phases in designing

(along the process), 12. Difficulties in designing, 13 Use of additional materials (to support the design process, such as pictures, videos, etc.), 14. Alternative design solutions (considered during the design process), 15. Interestingness value (extent to which the design process has been interesting), 16. Meaningfulness of task (extent to which the design has been meaningful), 17. Involvement of feelings in addition to reason in the design process, 18. Coping with constraints (attitude towards design constraints), 19. Overall evaluation of design (degree of satisfaction with the final design product), 20. Positiveness of the process as a whole (ease, interestingness, and meaningfulness of designing), 21. Criticism of task and conditions (listing aspects that could have contributed to increase the level of creativity).

## 5 RESULTS

The statistical procedures used for analyzing the data were mean comparisons (by the t-test) and correlations (Pearson Product-Moment). The results concerning self-assessed creativity and the level of expertise showed that advanced students were more aware of the design phases in their work and were better able to cope with design constraints. Advanced students scored higher in all the assessed variables except inventiveness, having a central idea, sense of difficulty during the design process, and being affected negatively by the different constraints of the task (See table 1). Table 2 presents comparisons between self-assessed design creativity and the grades obtained by novice and advanced students.

*Table 1. Design variables that scored higher in the group of novice students*

Design Variable	Groups	Number	Mean	Standard Deviation
Inventiveness	Novices	24	3.06	0.538
	Advanced	18	2.88	0.631
Central idea	Novices	22	2.90	0.426
	Advanced	17	2.76	0.664
Sense of difficulty during design process	Novices	24	4.71	2.074
	Advanced	18	4.44	2.175
Negative effect by constraints of the task	Novices	24	2.35	0.364
	Advanced	18	2.30	0.486

*Table 2. Pearson correlation coefficients between self-assessed design variables and the grades obtained by novice and advanced students during their design studies*

		Central idea	Awareness of design phases	Difficulties to achieve the design task	Exploring design alternatives	Changes in the final product
Novice students	Correlation	0.595	-0.431			
	Sig.(2 tailed)	0.006	0.058			
	Number	20	20			
Advanced students	Correlation			-0.533	0.414	-0.414
	Sig.(2 tailed)			0.033	0.088	0.088
	Number			16	18	18

## 6 CONCLUSIONS

This study examined attitudes and other individual characteristics of students in regard to self-assessed creativity in design. In particular, it analyzed relationships of self-assessments with variables, such as the level of expertise, and grades obtained by students in the course of their academic studies.

Findings about self-assessed creativity and the level of expertise showed that the advanced students are more aware of the design phases in their work, and manage to cope with design constraints while evaluating potential candidate solutions. In addition to these statistically significant results, the trend of the means in the two groups showed that the advanced students scored higher in all the assessed variables, except the following in which they scored lower: inventiveness (they were critical about the originality of their own designs), having a central idea (they considered a number of ideas at the same time), sense of difficulty during the design process, and being affected negatively by the different constraints of the task (their experience allows them to overcome problems, and deal successfully with design restrictions).

Additional comparisons between self-assessed design creativity and the grades obtained by students during their design studies showed that in the group of novices the overall grade was correlated positively with having a central idea, and negatively with awareness of the design phases. In the group of advanced students the overall grade was correlated positively with exploring alternatives considered in the course of designing, and negatively with the tendency to consider changes in the final product, sense of fluency and easy flow in the course of the design task, and experienced difficulties to achieve the design task.

It is to be noted that whereas advanced students tend to engage in the exploration of alternative designs that may lead to a potential design solution, novice students focus their design process in the development of a central idea. Programs of design education that seek to encourage and improve creativity may profit from the implementation of the present findings. Such programs should stress the importance of developing a central idea to arrive at a successful design solution. However, together with this, intervention programs should try to enhance the students' awareness of the different stages of the process. In particular, it is advisable to promote the exploration of alternative design solutions before engaging in the development of a central idea. This conclusion corresponds also to the conception that creativity requires both divergent thinking (viz. dealing with alternatives) and convergent thinking (viz. focusing on a central idea). These recommendations will help students, novices in particular, to adopt a more positive attitude toward the project, reduce their sense of difficulty derived from task requirements, and enhance their confidence during the design process.

## REFERENCES

- Bergum M.O., Self-perceptions of creativity among academic inventors and non-inventors. *Perceptual and Motor Skills*, Vol. 40, 1975, p.78.
- Candy L. and Edmonds E., Creative design of the Lotus bicycle: implications for knowledge support systems research. *Design Studies*, Vol. 17, 1996, pp. 71-90.
- Casakin H. and Kreitler S., The nature of creativity in design: factors for assessing individual creativity. *Proceedings of Studying Designers International Conference*. Provence University, Aix-en-Provence, 2006.

Cross N., Descriptive models of creative design: application to an example. *Design Studies*, Vol. 18, 1997, pp. 427–455.

Csikszentmihalyi, M., *Creativity - Flow and the Psychology of Discovery and Invention*, Harper Perennial, 1997.

Gero J., Creativity, emergence and evolution in design, *Knowledge based systems*, Vol. 9, 7, 2000, pp. 435-448.

Guilford J. P., Potentiality for creativity. In J. C. Gowan, J. Khatena, and E. P. Torrance (Eds.), *Creativity: Its educational implications* (2<sup>nd</sup> ed.). Dubuque, IA: Kendall Hunt, 1981, pp. 1-5.

Hanna R. and Barber, T., An inquiry into computers in design: attitudes before–attitudes after. *Design Studies* Vol. 22, 2001, pp. 255–281.

Khatena J. and Torrance, E.P., *Creative perception Inventory*. Chicago, Stoelting Company, 1976.

Norton J. L., Creative thinking and the reflective practitioner. *Journal of Instructional Psychology*, Vol. 21, 1994, pp. 139-147.

Onwuegbuzie A. J., Statistics anxiety and the role of self-perceptions. *Journal of Educational Research*, Vol. 93, 2000, pp. 323-330.

Paulhus D. L., and John, O. P. Egoistic and moralistic biases in self-perception: The interplay of self-deceptive styles with basic traits and motives. *Journal of Personality*, Vol. 66, 1998, pp. 1025-1060.

Schaeffer C. E. and Bridges C. I., Development of a creativity attitude survey for children. *Perceptual and Motor Skills*, Vol. 31, 1970, pp. 861-862.

Simon H., *The sciences of the artificial*. MIT Press, Cambridge, MA., 1981.

Suwa M., Gero J. and Purcell T., Unexpected discoveries and S-inventions of design requirements: a key to creative designs. In Gero, J. and Maher M L. (Eds.) *Computational Models of Creative Design IV*, Key Centre of Design Computing and Cognition, Sydney, 1999, pp. 539-567.

Contact information

Hernan Casakin (1, 2) and Shulamith Kreitler (3)

(1) The College of Judea and Samaria, Department of Architecture, P.O. Box 3, 44837 Ariel, Israel.

(2) The Porter School of Environmental Studies, Tel Aviv University, Ramat Aviv, Tel Aviv 69978, Israel. Tel. +972-3-6405718 Email: casakin@bezeqint.net

(3) Department of Psychology, Tel Aviv University, Ramat Aviv, Tel Aviv 69978, Israel. Tel. +972-3-5225371 Email: krit@netvision.net.il