THINKING SKILLS
AND CREATIVITY

Examining the plausibility of fostering creativity through puzzles in architectural education: An exploratory sequential study

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ARTICLE INFO

ABSTRACT

The study examines the plausibility of fostering thinking skills in architectural education through an open ended task based on a dissection puzzle, 'TANGRAM'. An exploratory sequential approach and mixed method analysis was adopted for the study. Firstly, it was organised as part of a faculty induction program conducted by 'National Institute of Advanced Studies in Architecture' in association with 'Council of Architecture' at a regional level. Secondly it was conducted in class as part of a course 'theory of design', to experience 'design puzzle and blocks' for the students in the fifth semester at Department of Architecture, Sathyabama University, Chennai. Qualitative and quantitative data on the 'framed task', 'channels to creativity' and the 'outcomes' were collected, consolidated and analysed. Findings posit that puzzles are sources to frame diverse open ended tasks to foster creativity and have potentials to be introduced in basic design studio, offered as a foundation course in architectural education across the nation.

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1. Introduction

Stimulating creative solutions based on solid scientific basis for decision making process is the goal in design education (Kowaltowski, Bianchi, & Paiva, 2010). Accumulating knowledge through the process of constructing new thoughts, information or design and product over time (Kahvecioglu, 2007), providing opportunities to explore cognitive processes systematically (Hargrove, 2011), fostering critical, creative and pragmatic thinking amongst the students (Ibrahim & Utaberta, 2012; Salama, 2005) are broad objectives in architectural education. Design problems are both multidimensional, highly interactive (Lawson, 2006, p. 58) and serve as the base for understanding, structuring information and a direction to generate solution (Cross, 2001). Such tasks develop skills, required knowledge and provide an insight to the future roles amongst the novices.

In order to mould the young minds for the higher years of study and the multifaceted profession, basic design is offered as a foundation course in architectural education. The exercises are framed so as to promote divergent, intuitive, imaginative approaches and unleash the hidden abilities to evolve creative ideas (Ibrahim, Bridge, Chase, Bayoumi, & Toha, 2010). Formulating design tasks is crucial as the focus is on crafting the personality where novices learn to develop appropriate solutions (Dua & Chahal, 2014). Originality streak is driven by the surprising elements of the design task (Dorst & Cross, 2001). It is posited that experimental methodology develops learning style and creative spirit of the students (Boucharenc,

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2006; Prashar, n.d.). In this context, we have explored a unique way to incorporate a puzzle in a studio as an initiative to integrate basic design and arts. This study posits that participation in such puzzle based open ended task is loaded with fun, involvement, surprise, fosters creativity giving an insight to various thinking skills.

1.1. An insight to puzzles

We have classified puzzles broadly as mechanical, virtual, logical, visual, graphical, numerical and verbal puzzles. A mechanical puzzle is a physical object having one or more specific objectives are constructed for the purpose of exercising an individual's skill. They are classified as put together or dissection, take apart, interlocking, disentanglement, sequential movement, dexterity, puzzle vessels, vanishing, folding and impossible puzzles (Slocum, 2001).

1.2. Puzzle based learning

Merriam Webster dictionary defines 'puzzle' as a mentally challenging problem. Puzzles are invented primarily to entertain which can also instruct and can be both a visual and tactile delight (Slocum, 2001). It is an enjoyable single player activity (Kindall, Parkes, & Spoerer, 2008; Kawash, 2012). Puzzles are educational, engaging, thought provoking and illustrate many useful and powerful problem solving ideas in an entertaining manner (Michalewicz & Michalewicz, 2007). In this context, Michaelwicz, Falkner, and Sooriyamurthi (2011) structured a new course, 'puzzle based learning', addressing 'what we learn', 'how we learn' and 'how we apply the gained knowledge'. This course propagates the framing of unstructured domain independent problem, fostering critical thinking, logical and abstract reasoning, paving ways for problem solving intangibly. Reasoning involved in solving puzzles reinforces the foundational concepts in computer science (Falkner, Sooriamurthi & Michealwicz, 2009; Falkner, Sooriamurthi, & Michalewicz, 2012).

Moursund (2006, p. 54, 55) identified 'domain specific' as one of the eight directions to introduce puzzles in education. He claimed that experience gained through solving a problem along with reflective thinking builds apt intuitions. Studies reveal that puzzles are used to understand concepts in Science, Technology, Engineering and Mathematics. Puzzles are also used in medical field (Rubinstein, Dhoble, & Ferenchick, 2009). It enhances the performance of students (Stetzek, Deeter, Parker, & Yukech, 2015). Puzzle solving approach enhances the young minds to think deeply in an indirect way as responses to the question 'Why' and 'How?' (Çelik & Aydinli, 2007). Irrespective of advantages, puzzle based learning is observed to be underexploited in education (Badger, Sangwin, Medina, & Thomas, 2012).

1.3. Puzzles: a channel to creativity in architecture

According to Antoniades (1992), channels to creativity in architecture are broadly classified as 'tangible' and 'intangible'. The famous architect, Frank Lloyd Wright, played with Froebel pieces in his childhood days which had an impact in his architectural practice. As we have interpreted 'puzzle' as a tangible channel to creativity, a preliminary study on how some famous architects evolved concepts from puzzles were explored by collecting data from secondary sources like books, magazines, web sites, articles and interviews. It is observed that architects have looked in to different puzzles like mechanical, folding, virtual, construction; sliding and tiling for inspirations (see Appendix A). The puzzles are either translated or transformed in to tangible and intangible expressions. The former includes the literal expression as envelope, facade, kinetics, massing etc and the latter as design process and exuberance as summarised in Table 1.

The directives are broadly categorised as 'mimesis' and 'metaphor' falling under the tangible and the intangible channels respectively. We observed that the latter is further sub classified as 'tangible metaphor', 'intangible metaphor' and 'combined metaphor' (Antoniades, 1992, p. 30) as interpreted in Table 2.

1.4. Architectural education in India

From 1983, 'Council of Architecture' is empowered to frame the minimum standards of Architectural education in India. Design studio is the core in architectural design which includes design problem, context, space standards, study of precedents, site inventory analysis, models etc to evolve and develop appropriate solutions. The different phases involve collective and individual involvement in analysis, interpretation, synthesis, design processes to evolve 'context specific outcomes' based on the type of design problem introduced. It is better to encourage the students to work individually as well as collectively right from the initial stages of education.

Traditionally, theory courses like 'visual arts' or 'art appreciation', 'theory of architecture' or 'principles of architecture' and studio courses like 'basic design', 'art studio' are offered in the first semester to foster principles of design in both two and three dimensional compositions as a foundation course along with 'architectural drawing' (Minimum Standards of Architectural Education, 2015). Most of the schools offer 'basic design' and 'theory of architecture' either as an integrated studio course or separately as a studio and a theory course. It develops the creative and aesthetic senses to appreciate art as well as evolve unique expressions in different forms. The basic design curriculum gives the framework to introduce tasks which enable individuals to think and express ideas revolving around design elements like point, line, plane, form, colour, shape, texture; visual design principles like balance, rhythm, emphasis, proportion, repetition, axis, hierarchy, dominance