

Creativity with Building Information Modelling Tools

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ABSTRACT

Whilst the application of BIM continues to be acknowledged and prevailing, design practitioners and academics find themselves in a paradox with an on-going discussion on the impact of BIM tools on design creativity and innovation. Literature suggests that BIM tools can hinder design creativity due to: parametric limitations; interoperability; and the demand for detailed information at preliminary design stages. However, other literature shows that BIM tools increase design creativity, and at some point provide limitless opportunities to be creative. The aim of this paper is to identify and verify the impact of BIM tools on design creativity. It is important for architectural students and practitioners to be aware of the impact of BIM tools on the design. A literature review was used to identify the benefits and constraints of BIM tools on design creativity; a questionnaire survey was used to verify its impact. The questionnaire survey was conducted with the top 100 UK architectural firms (group one) and CNBR Yahoo Group (group two). It was found that BIM tools do not affect design creativity and innovation in the opinion of the respondents. This paper enlightens the status-quo of BIM tools on creativity and innovation, but will focus on the impact of BIM tools on architectural design creativity in the early design phase more closely. This research would be important to both academics and architectural designers using BIM in their various applications.

Keywords: Building Information Model, Building Information Modelling Tools, Creativity, Design, Innovation

INTRODUCTION

Building Information Modelling (BIM) has the potential to significantly change the traditional design process, raising concerns within both academia and professional design studios. The impact of BIM technology on architectural

design creativity has been previously debated in academic publications, such as Ibrahim and Rahimian (2010); Meneely and Danko (2007); Zarzycki (2010); and Moreira (2010). Other mediums conducting BIM and design creativity debates includes seminars, and professional's online social networks. A questionnaire survey was conducted to collect primary data; the UK top 100 architectural firms based on the Building

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Magazine 2010 (group one), and Co-operative Network for Building Researchers (CNBR) Yahoo group (group two) were selected as questionnaire respondents. This paper focuses on the impact of BIM tools on architectural design creativity. However, architectural design is a process that usually starts with the following sequence: a client's brief; design appraisal; and the conceptual idea (schematic design) that is later developed and realised as a design product. BIM tools play a major part in achieving productive design outcome and reducing total design hours through digital automation. Reddy (2011) states that *BIM also provides the ability to develop the wildest design concept within the constructability analysis of their design.*

The BIM tools used to realise BIM's benefits are arguably decreasing design creativity in the opinion of some BIM users, academics and professional architectural designers within the Architectural Engineering and Construction (AEC) Industry; whilst increasing creativity to others. Creativity is important in the realm

of design, it takes place in diversity, series of products, events and accomplishments; It can be found in various fields of disciplines. Attributes of creativity adopted from Pederson and Burton (2009) described creativity more closely as: Idea/analogy/knowledge; problem definition; original/originality; novel/new; imagination/artistic/aesthetic interests; risk taking /complicated/complex; and innovation/freedom/flexible. Creativity refers to the ability to invent new products, processes, solutions, and work of art that are useful and depicts originality; creativity can also be defined as a technique for creative thinking. The definitions of creativity in Table 1 were chosen to show in-depth and diversity in creativity. The applicability of creativity occurs in different realms of life. However from the various definitions of creativity in Table 1, creativity can be defined as new knowledge, product, development, or original idea that is useful, valuable, beneficial and important to our lives.

Table 1. What is creativity?

Reference	Definition
Martin (2007)	States that scientific creativity is "moral creativity when it promotes human well-being, improves his environment, and enriches the meaning that we find in life".
Runco (2006)	States that "creativity is defined so as to allow for both continues and discontinuities in development".
Stenberg (2006)	Defines creativity as an innovation that is new, original and beneficial.
Nagel (2000)	Defines creativity as more than finding new ways of doing things but refers to "finding alternatives that are capable of exceeding the best expectations of all sides and view-points to dispute or dilemmas".
Mumford (2003)	States that "creativity involves the production of novel, useful products"
Boden (1998)	Describes that "creativity is a puzzle, a paradox, some say a mystery" that is valuable.
Boden (1994)	Describes that "creativity is a prized feature of the human mind" used to make a difference.
Feldman et al. (1994:1)	States that creativity is defined as "the achievement of something remarkable and new, something which transforms and changes a field of endeavour in a significant way".
Owen (1992)	Describes that "creative thinking is not confined to the few, it can be systematically implemented and employed with great success to develop concepts for new products, systems and institutions".

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