UNIVERSITI TEKNOLOGI MARA

A CONCEPTUAL MODEL OF CREATIVE IDEATION USING 3D NON-PARAMETRIC MODELLING TOOLS AMONG ARCHITECTURE STUDENTS

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ABSTRACT

The non-parametric 3D modelling tool is one of the alternative methods for the creative architectural works. It facilitates mental images and the abstract nature of idea generation, which is akin to sketching and physical model creation compared to parametric design tools. However, the tools are not quietly used in the stage of design conceptualization but rather as a presentation tool. To what extent can the tool expand architectural design concepts' creative output? What are the cognitive creative process that involves in different levels of creative output? The research aims to propose a model of creative conceptual ideation of non-parametric 3D modelling tool for architecture students. Three objectives were conducted, (i) to identify the creativity indicators for a creative conceptual ideation; (ii) to evaluate the creativity level of a conceptual ideation of 3D modelling tool; and (iii) to analyse the creativity process in a conceptual ideation of 3D modelling tool. In solving the objectives, the research used a quantitative method approach to identify the creativity level and creative process. An experimental-posttest was conducted to two different groups of final-year architecture students from UiTM, Perak Branch, Malaysia. The first group served as a control group whilst the second group were high performing students. Similar design competence among participants allows the identification of the creative process. The experiment required participants to perform a 45-minute design task using the tool from start to finish. The study finalized 4 creative indicators as fluency (number of ideas), flexibility (types of ideas), originality (uniqueness) and functionality (practicality). High fluency drawings were gathered as drawing samples for further creativity evaluations. 59 practicing architects and architecture academicians partake in the evaluation of 13 drawings using a 7-point Semantic scale survey to objectively evaluate creativity level of design concept output that is subjective in nature. The posttest of the experiment collected a series of 5-point Likert scale questions relating to the participants' creative process during the design task. The relationship of fluency was analysed with the evaluated creative output and creative process. The relationships were developed into a model. The main findings evaluated the drawings to be more functional than original. Only a small portion of students were able to produce unique solutions, even from high performing students. However, higher originality can be seen in each participant's later alternatives. The flexibility was seen increasing by the third alternative and above. The higher number of alternatives equivalents to higher actions, which in past study is applied by higher competent designers. The model recommends architecture students to use non-parametric 3D modelling tool in design conceptual ideation by producing multiple actions and alternatives to achieve original unique ideas. The original alternative can later be developed for functionality using the tool.

Keywords: Creative, conceptual ideation, architectural design process, non-parametric 3D modelling tool

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TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

The chapter briefly discusses the thesis's background, problem, concerns, aims, objectives, methodology, scope, and significance before outlining the thesis chapter by chapter as shown in Figure 1.1.

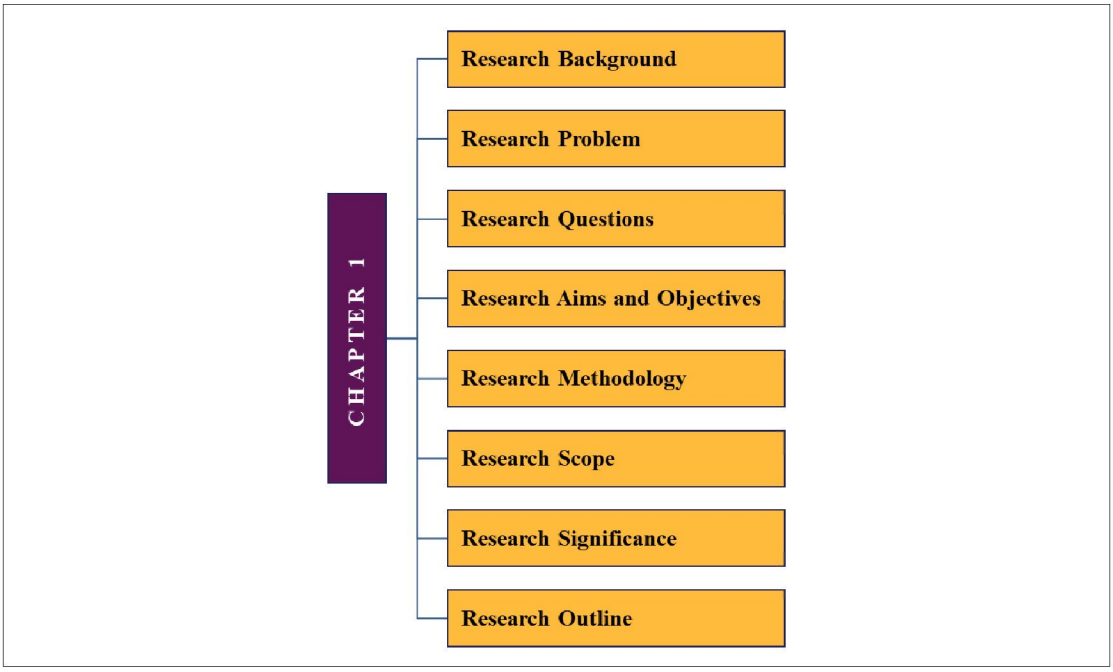

Figure 1.1 Overall Mapping of Subtopic in Chapter 1 (Author, 2024)

1.1 Research Background

Inadequate architectural design concepts can negatively affect both the construction process and the final product of a building. It influences the overall design and decision-making as a guiding principle. Poor architectural design has a negative impact on the environment (Zhou, Ma, Tam, & Le, 2023); 37% of the world's energy-related carbon emissions in 2020 resulted from carbon dioxide emissions from building activities (IEA, 2020). It also affects the health and safety of occupants and users (Samsudin, Yuhaniz, Sayed Abul Khair, & Zainonabidin, 2021). In addition to economic concerns that can lead to higher maintenance, operating costs, decreased property values, and difficulty attracting tenants or buyers, architectural design plays a