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COOL COLOUR IMPACT ON THERMAL COMFORT AND SENSATION

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ABSTRACT

It has become a worldwide priority to achieve indoor thermal comfort and sensation through creative and energy-sufficient ways as climate change becoming a growing concern. Colour as one of the important characteristics in indoor spaces has been lacked for its consideration towards thermal comfort and sensation due the inadequate evidence and investigation. Therefore, this study aims to determine the impact of cool colour thermal comfort and sensation. 3D simulation model of walkthrough in a reading room was used as the mediator to test the impact of cool colour hue on thermal comfort and sensation. 30 subjects – 19 males and 11 females – from different group of age participate in this study. Subjects had been visualized with a reading room simulation model with 5 different wall colours (white, blue-green, green, purple-blue and purple). For each simulation model, subjects were surveyed regarding their thermal comfort and sensation as well as body test of heart and blood pressure. Descriptive analysis found no difference on thermal comfort and sensation between white coloured wall and cool coloured wall. Participants felt cool and comfortable regardless the simulation conducted in warm environment. However, t-test analysis did not found significance value that showed cool colour hue did not reduce heart rate and blood pressure as $p > .05$. Pearson Coefficient Correlation analysis found that there was positively moderate correlation between heart rate and thermal comfort in purple-blue room, r=0.410, n=30, p=0.025. Thus, people feel more uncomfortable when heart rate rises in purple-blue room. There was also negatively moderate correlation between heart rate and thermal preference, r=-0.379, n=30, p=0.039. This means that people prefer warmer condition as their heart rate decreases. However, these results did not aligned with the result of t-test analysis. Without any significance result future works should be address to improve current study.

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

The indoor thermal environment forms part of the component of indoor environmental quality which is influenced by the climate. Nowadays the issue of climate change has posed a danger to the human world. Achieving thermal comfort indoors through creative, sustainable and energy-efficient solutions is a priority of contemporary research worldwide. This corresponded to the 4th strategic thrust in Malaysia 11th plan (2016-2020) that pursues sustainable and resilient green development. Numerous efforts have been made to improve the thermal comfort level for each person, particularly in residential buildings with thermal comfort.

The level of thermal comfort in residential buildings significantly influences the emotion and physicality of the occupant. Optimal thermal comfort can result in an environment of high quality inside. Since the quality of life of a person can be influenced by the perceived level of thermal comfort felt. Comfortable indoor temperatures have a major effect on one's self-esteem level while the hot temperatures will cause various issues such as sweating, tiredness, skin allergies and many more. This will lead to the 3rd Sustainable Development Goals (Good Health and Well-being) where good condition of thermal comfort can improve 5% to 10% of productivity (Rosenlund, 2000), increase performance from 7% to 18% (Heschong, 2002) as well as occupant’s health (Senin & Mydin, 2013). Achieving the 3rd goal of SDG will help in reduce the number of mortality and illness from hazardous chemicals, air and contamination. Reduce diseases through prevention, treatment and promote mental health and well-being (“WHO”, n.d).

Colour, being a characteristic property of any indoor climate, was rarely considered in this regard because of its thermal impacts. Colours were commonly used for beatification in the interiors to activate occupants' thoughts, feelings, emotions and actions parallel to the correct ambience to be created. It is found that colours modify the perceived dimensions and properties of a space; height, width, size, proportions,