

## INTEGRATION OF SUSTAINABILITY ISSUES IN INTERIOR DESIGN EDUCATION IN MALAYSIA: A SYSTEMATIC LITERATURE REVIEW

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### ABSTRACT

Concern over the environmental impact resulted from the overuse of natural resources to fulfil human needs are increasing in recent years. To minimize the harmful effect on the environment, the understanding of sustainability consciousness in interior design helps stimulates the basic human needs to practice considerate usage of electricity, water, materials, and resource quality. A systematic literature review (SLR) offers an overview of topics to clearly define and help select the issues that are potentially applicable from one or more research questions identified. It involves thorough scanning of databases and keywords in an electronic search engine. Through this SLR analysis, despite having comprehensive general research on sustainable interior design, it is found that exposure to sustainability issues in interior design education in Malaysia has a minimal number of direct research results. It further indicates that a research gap can be established in the body of knowledge, contributing to the further improvement of research aims and research questions. It suggested that the early incorporation of sustainability concerns into interior design education is crucial to raise awareness of better environmental development for future generations. For instance, education on knowledge of sustainability, understanding, or the incorporation of environmental issues may lead to necessary practicality for sustainable interior design.

**Keywords:** Systematic literature review, sustainability, interior design, education, Malaysia.

### INTRODUCTION

This article discusses the use of a systematic literature review to identify the sustainability of interior design education from existing articles on a database in an organized way. Over recent years, there is a high demand for sustainability issues to be introduced in interior design education since the degradation of the environment. The understanding and practices of sustainability in interior design have been seen as a dramatic shift to focus on creating healthy and sustainable environments for people to live and work (Kang and Guerin, 2009). Several higher education institutions have made significant efforts to incorporate sustainability into academic research programs, community involvement, and own management (Lozano, 2006). According to LEED evaluations, there are six categories for sustainable interior environments. These include site development, energy and water efficiency, materials, indoor environmental quality, innovation and design process (Ayalp, 2012). As mentioned in Alansari, Wagner, and Amor (2015), the provision of sustainability knowledge in interior design allows better design practicality that could create a balance between human use of resources and nature's ability to replenish. According to Piper (2013), a systematic literature review is an assessment that efficiently limits the search of relevant research questions to avoid misleading and non-specific literature. It is mainly to select databases of several criteria that contain the limits, keywords, inclusions, and exclusions. The specific terms of sustainable, sustainability, sustainable development, and green design are often defined interchangeably. The definition of sustainability reported by the UN World Commission on Environment and Development (1987) is 'meeting the needs of the present without compromising the ability of future generations to meet their needs'. This article focused on the preceding papers to systematically identify whether sustainability has relevance in interior design education in

Malaysia and how many publications were published. Concerning the sustainability issues, previous studies tend to focus on architecture and environmental legislation that target the architects but ignored but ignored the sustainable interior environment aspects. According to Opaku and Ahmed (2015), 'education is the key to environment-conscious future generations, educators, and professionals in different disciplines.'

## METHODOLOGY

The systematic review is known as a structured database search, which includes criteria to be included, such as database sources, keywords, limits used (title, subject, and year), with the inclusions and exclusions have resulted in the results appearing thoroughly without bias and repetition (Piper, 2013). This research process included peer-reviewed studies and articles published after the 2009 research design. As a result, the scope of this study limits studies published over the last ten years but founded that one of the articles published in 2006 was relevant to Malaysia's architectural education. Therefore, the systematic literature review attempted to systematically outline the previous literature related to sustainability awareness in interior design education. Thus, it relates to the curriculum of sustainability involved with the perception from the educators, students, and professionals in related fields. The search should strictly conform to the selection criteria laid down in the evaluation to answer the pre-determined questions. Note that some studies may cross-reference other studies; to further explore more on the awareness of sustainability in interior design education in Malaysia, thus the approach of the questionnaire method is required.

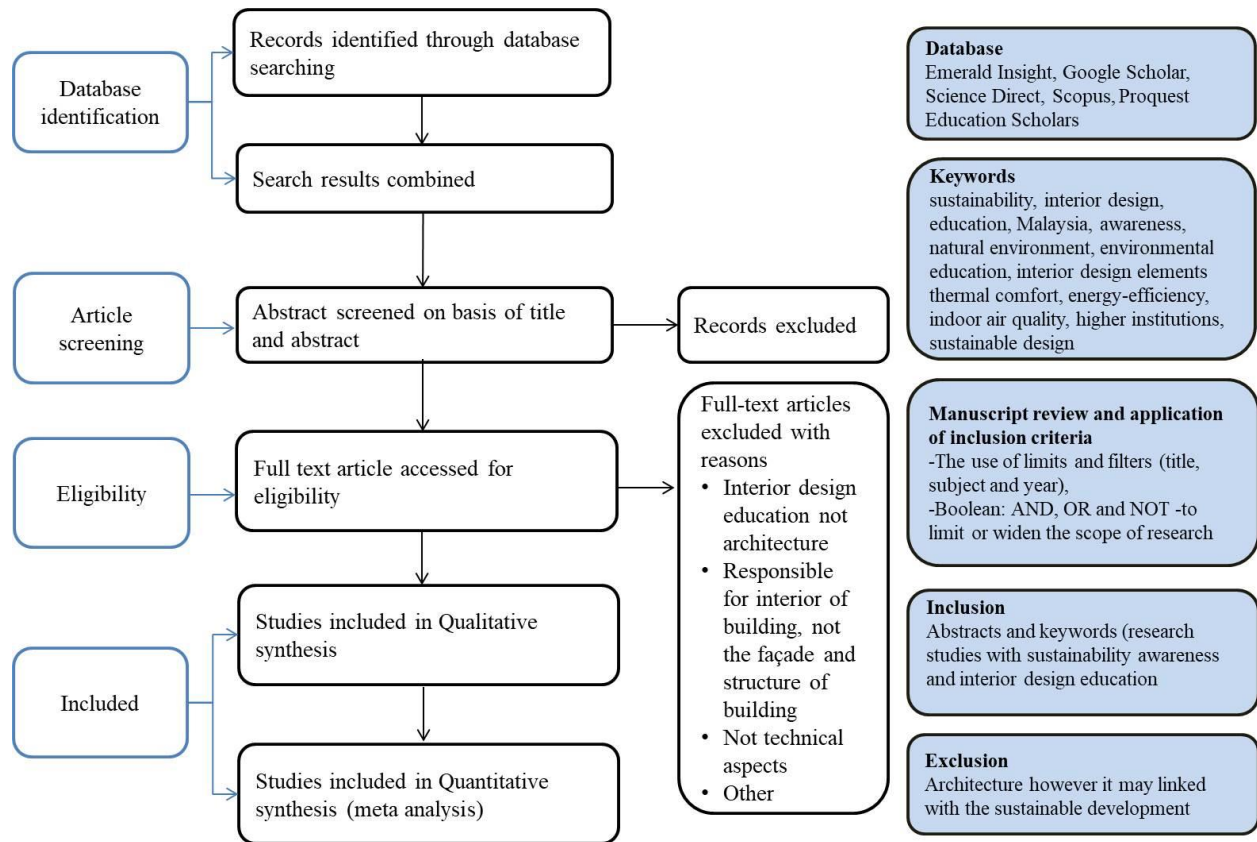
### 2.1 Search Process

A search engine is a tool for literature findings. Since it contains many different sources and to avoid any irrelevant data, criteria are needed. Some of these criteria comprise of selected databases, part of articles (abstracts, full-text or title), the use of limits and filters, as well as the use of Boolean helps to limit or widen the scope of research. Those common uses of Boolean are AND, OR, and NOT. The systematic evaluation provided a strict, unbiased, and literature-wide review of research results and quality. This study explores abstracts and keywords for the recognition of sustainability and research studies on interior design education. The main significant point is to highlight the article published in Malaysia in regard to sustainability in Interior design education. In total, 14 keywords were reviewed and identified in five databases.

**Table 1** List of search databases, keywords, and inclusion criteria used for the literature review

| Search Databases  | Keywords  | Inclusion criteria  |
|---|---|---|
| -Emerald insight<br>-Google Scholar<br>-ScienceDirect<br>-Scopus<br>-ProQuest<br>Education Scholars | Sustainability, Interior design, education, Malaysia, awareness, natural environment, environmental education, interior design elements thermal comfort, energy efficiency, indoor air quality, higher institutions, sustainable design solutions | Initial screening (title, abstract, and full report). English language.<br>Scholarly publication articles and journals between 2009 until 2019.<br>Peer-reviewed sources addressed sustainability interior design education and Malaysia. |

**Fig. 1** Flow diagram of study selection for systematic review



## 2.2 Inclusion and exclusion

In the meantime, there are several global research databases available online, but in this research; only five databases are relevant to the subject field. These databases have the largest number of records to be analysed and retrieved for further study. These include databases from Emerald Insight, Google Scholar, Science Direct, Scopus, and ProQuest Education Journals. Scopus provides a comprehensive source of scientific/ technical articles. Science Direct provides a platform for high-quality peer-reviewed research articles and journals that are generally open to everyone. The keywords in the search engine were sustainability, interior design, education, Malaysia. The date of the last search for five databases was on August 19, 2019.

**Table 2** List of the results from five databases with the basic keywords

| Database        | Keywords   | Number of results |
|-----------------|--|-------------------|
| Emerald insight | All fields (sustainability AND interior design AND education)                      | 917               |
|                 | (sustainability AND “interior design” NOT Architecture AND education and Malaysia) | 14                |

|                             |   |       |
|-----------------------------|---|-------|
| Google Scholar              | (sustainability AND interior design AND education)                                  | 23300 |
|                             | (sustainability AND “interior design” NOT architecture AND education AND Malaysia)  | 1750  |
| Science Direct              | All fields ( sustainability AND interior design AND education)                      | 794   |
|                             | (sustainability AND “interior design” NOT architecture AND education AND Malaysia)  | 9     |
| Scopus                      | TITLE-ABS-KEY ( sustainability AND interior AND design AND education )              | 49    |
|                             | TITLE-ABS-KEY ( sustainability AND interior AND design AND education AND Malaysia ) | 1     |
| ProQuest Education Journals | All fields (sustainability AND interior design AND education and Malaysia)          | 60    |

For an appropriate quality of articles, the selected abstracts and full-text articles need to be checked and verified manually and thoroughly to avoid any bias in publication. The inclusion of the data evaluation should be consistent with the parameters of the article chosen. These criteria include search terms, limitations (title, subject, and date), abstract scanning, data extraction, and so on. As indicated in the above table, 49 results shown in the Scopus database after the exclusion of keywords that do not relate to the data, but there is only one result after the inclusion of Malaysia's word in sustainability education in interior design. As a result, it has created a gap in the body of knowledge due to previous papers only looked at the perspective of architectural education and the environmental field. However, as reported by Zalina Shari' and Mohd Fakry in their article titled 'Towards a comprehensive and sustainable architectural education in Malaysia' (2006), architectural education in Malaysia usually involves studying both the exterior and the interior design of buildings. Those included in the education program is the importance of environmental improvements, thermal comfort, and indoor air quality. Compared to interior design, the main distinction between architectural education and interior design, mainly by the general architectural principle; measured by four elements: the roof, corner, base, and entry. While in Interior design education, human needs are being met rather than externals concerning interior space, structure, light, materials, and colour. There is still a lot to do to strengthen the process of implementing a sustainable issue in the field of interior design education. However, in the context of Interior design education in Malaysia, the Council of Accreditation and Architectural Education Malaysia (CAAEM), 2019, has recently accredited the interior design programmes to ensure the requirements for successful graduates are relevant to the design, technical, and professional skills needed for qualified and Professional Interior design practice.

### 2.3 Data extraction

The articles are being extracted and have been listed in columns accordingly. The first column stated the research study references. Step 1: if the paper is a one-off study that explains definitions and its sustainability analogy concept (Y=Yes, N= No). Step 2: To identify the article's findings as a theory or practical in using sustainability principles. Step 3: Identifies the methodology of the

study. Step 4: stated the research objectives on the level of awareness and understanding in a specialized background of education regarding sustainability. Step 5: indicated the sustainability design solutions in interior design and, or architectural education to encounter environmental issues. Next, the data divide into two groups: Firstly, the context of the publication in Malaysia and secondly, the context of International Publication on regards to the sustainability in interior design education. The table below showed a list of literature reviews using different methodologies.

### 2.3.1 Malaysia publication articles and journals.

**Table 3** List of research studies about the importance of sustainability in interior design education, the methodologies used, the objectives and, design solutions.

| References                              | Steps |   |                                     |   |  |
|---|-------|---|-------------------------------------|---|--|
|   | 1     | 2 | 3                                   | 4   | 5  |
| Zalina Shari' and Mohd Fakry (2006)     | Y     | T | Questionnaire survey                | To promote sustainability and encouraging the university to emphasized more on sustainability issues in architectural education.  | The study could establish with the integration of sustainability knowledge at an early stage of programs, additional seminars conferences, etc.  |
| Habibah Lateh, Muniandy (2010)          | Y     | T | Questionnaire survey<br>Qualitative | To understand the importance of Environmental Education (EE) as a tool in environmental management among teachers and lecturers. Thus this study explores the current situation of Environmental education in Teachers Training Institute (TTI).              | This study showed that immediate action to be acknowledged by the government of Malaysia and the related NGOs to integrate environmental education since the findings of 0% answered by the respondents claimed that they are not aware of the integration of environmental education in the lesson curriculum plan.   |
| Mirrahimi, Tawil, Abdullah et.al.(2010) | Y     | T | Literature review                   | To proposes that outdoor learning, which is related to nature, offers students an occasion for improving academic achievement and social-emotional intelligence   | Among all of the approaches in the education curriculum, outdoor learning helps to develop environmental awareness, sustainability training, and various green systems among the students.   |
| Roslan Talib and Mohd Sulieman (2011)   | Y     | T | Survey                              | This study constitutes an initial platform to assess the sensitivity of students as they apply sustainable interior design issues in their academic studio projects with a fair knowledge of environmental designs or as sustainable or green design factors. | Efficient teaching methods and education strategies help to improve the understanding and knowledge of relevant issues in interior design.<br>A conducted survey was done in the University Sains Malaysia (USM) as one of the most prominent universities that integrate sustainability issues in the Interior design studio exercise as a standard practice. |

|   |   |   |                |   |   |
|---|---|---|----------------|---|---|
| Siew, Che-Ani, Tawil et.al.(2011)   | Y | P | Model analysis | To compares two main models of thermal comfort and presents an improved model system based on the integrated assessment method both for thermal comfort and the efficiency of ventilation.  | Optimizing natural ventilation should be viewed as an aspect that enables cool air to access the interior of the building. Includes installing thermal insulation materials such as tinted glass or passive solar shading components.                       |
| Nawwar Shukriah Ali, Farhana Khairuddin and Shahrman Zainal Abidin (2013) | Y | P | Case study     | This study outlines the use of waste materials to recreate a functional interior. The process of converting waste materials or useful products into new products, which also contribute to a better environmental value, can create a distinctive yet functional interior area. | In designing interior spaces, recycled materials could be part of the design solutions practically. Thus, it creates significant awareness of the need to solve environmental issues by conserving the natural resources in a constructive design approach. |

The above tables have indicated that mostly environmental educations are a concern in the education of Malaysia regarding sustainability while only a few interior designs are studied. The four primary categories identified in the study based on these references: firstly, sustainability elements in interior design, such as energy efficiency, choice of materials and, etc. Secondly, the identification on awareness and integration of sustainability in architecture education. Thirdly, factors affecting environmental change, thermal comfort, and indoor air quality are described that acknowledge the importance of health and learning. Fourthly, the significance of interior design education in the context of Malaysia. Note that one article is spotted to be closely related to the design education in Malaysia of an architectural background field. In the paper entitled Towards a Holistic Sustainable Architectural Education in Malaysia by Zalina Shari and Mohd Fakry (2006), the awareness of sustainable development in architectural education can contribute to a promising future by transforming future architects since architects are crucial to the development of our built environment.

On the other hand, people nowadays are also aware of the factors of sustainability in interior design, not only on the exterior project. They demanded a more sustainable environmental design in interior spaces to encounter internal issues such as indoor air quality, thermal comfort, etc. Therefore, sustainability is to be part of the education teaching method as one of the standard practices applied in interior design to help to measure the student's sensitivity on environmental issues (Roslan Talib and Mohd Sulieman (2011). International publication articles and journals are being extracted and grouped accordingly. Step 1: if the paper is a one-off study that explains definitions and its sustainability analogy concept (Y=Yes, N= No). Step 2: To identify the article's findings as a theory or practical in using sustainability principles. Step 3: Identifies the methodology of the study. Step 4: stated the research objectives on the level of awareness and understanding in a specialized background of interior education regarding sustainability. Step 5: indicated the sustainability design solutions in Interior design education to encounter environmental issues.

### 2.3.2 International publication articles and journals

**Table 4** List of research studies about the importance of sustainability in interior design education, the methodologies used, the objectives, and design solutions.

| References                             | Steps |   |   |  |   |
|--|-------|---|---|--|---|
|  | 1     | 2 | 3   | 4  | 5   |
| Gulwadi (2009)                         | Y     | T | Content analysis                                      | The utilization of pedagogical efficiency in a sustainable design studio of reflective paper writing   | The holistic collaboration of sustainability with a systematic way of thinking and reflective journal that fosters an integrated design.  |
| Kang and Guerin (2009)                 | Y     | T | Questionnaire survey                                  | To establish education strategies by examining the state of environmentally sustainable interior design practice.  | The enhancement of teaching methods on environmentally sustainable interior design creates awareness of the effect of interior products on the life cycle.  |
| Ruff and Olson (2009)                  | Y     | T | Questionnaire survey                                  | Provide a suitable education for supporting the use of sustainable products and methods.   | To foster the principles of lighting, acoustics, thermal comfort, and indoor air quality in interior design education.  |
| Brković and Milošević, (2012)          | Y     | T | Observational study                                   | Sustainable schools with environmental sustainability principles   | Concerning acoustic comfort, safety, and visual quality of sustainable school   |
| Dickinson, Anthony, and Marsden (2012) | N     | T | Questionnaire survey using independent <i>t-tests</i> | To investigate the perceived attitudes of interior design practitioners towards the inclusion of undergraduate and graduate research in interior design. | The curriculum helps to provide more significant study experiences at both undergraduate and graduate levels on research findings and design projects.  |
| El-Zeiny (2012)                        | Y     | T | Questionnaire survey<br>Interviews                    | To explore the present situation of sustainability learning in Egypt's university in the interior design curriculum.                                     | Sustainability focuses on teaching at all levels of the interior design degree program with the involvement of educators, resources, and the government to create awareness.  |
| Gosling, Gifford, and Mccunn (2013)    | Y     | P | Literature review<br>Site study                       | To psychologically understand between theories and findings of the interior environment that affects well beings.  | The importance of environmental factors in interior design helps to develop satisfaction, health, and performance of the building occupant. At the same time, offering low environmental impact and lowering pollution. |
| Gale, Martin, Martin, et al. (2014)    | Y     | T | Literature review<br>Questionnaire survey             | To increases sustainable design collaborative learning progress through the curriculum between upper and lower division students of interior design.     | Understanding of the concept, principles, and theories of sustainability: building methods, materials, systems, and occupants.  |

|                            |   |   |  |  |  |
|----------------------------|---|---|--|--|--|
| Alansari and Wagner (2015) | Y | P | Cross-sectional study<br>Questionnaire survey  | To green the interior design education in Kuwait and to assess the level of environmental design knowledge amongst Interior design students. | Developing a curriculum framework of sustainability integration in an interior design course. Changing the student's attitudes and perceptions towards sustainability. |
| Hayles (2015)              | Y | T | Observational study                            | Sustainable material choice for interior design practice helps to minimize the negative impacts on the environment.                          | GSFT (Green, sustainable or Fair Trade) product  |
| Soliman (2016)             | Y | T | Literature review                              | Educational teaching method for pedagogic design studios in architectural programs   | Design communication methods, teachings, and learning as a general rule to produce creative design projects.   |
| Stark and Park (2016)      | Y | T | Longitudinal study<br>Questionnaire survey     | To evaluate student views on sustainable design issues as part of an accredited interior design program                                      | The life cycle thinking, environmental and social responsibility in the procurement of materials and sustainable design practice                                       |
| Assali (2017)              | Y | T | Case Studies                                   | To further explore ways of improving the education of sustainable design through the design studio.  | The practicality of sustainable design should begin at the lower level of the interior design studio curriculum.   |
| Rashdan and Ashour (2017)  | Y | T | Literature review                              | To propose a set of criteria based on a full literature review to select viable interior design alternatives.                                | Materials selection, construction methods, furnishing, and lighting  |
| Demirkan and Afacan (2018) | Y | T | Theoretical analysis<br>Morphological analysis | Propose a goal framework on interior environments to positively contribute to human well-being.  | The efficiency of the site, energy, water, material, and resources   |

## RESULTS

The above literature findings have identified the definite concept of sustainability that has a great concern to the environment over some time. As conducted by Ruff and Olson (2009), the accessibility of sustainability knowledge could improvise the decisions made by all related fields in education to create awareness in minimizing the negative impacts on the environment. In the research conducted by Zalina Shari' and Mohd Fakry (2006), the architectural education as written in LAM (2005) emphasized, only with adequate knowledge on sustainability and the integration into the architectural curriculum, helps to create an environmentally sustainable architectural design, both aesthetically and technically.

The interior design program has been accredited and recognized by the Architectural Accreditation and Education Malaysia (2019) as one of the professional programs in Malaysian education. The



council of the interior design students has set criteria such as the integration of knowledge in the aspects of values, function, and aesthetics in human behavior. The design processes use the principles of lighting, acoustics, thermal comfort, indoor air quality, health, safety, and performance of building occupants. Thus, there is a sustainability gap created due to the limited approach between design principles and its practices of environmentally sustainable interior design (Hayles, 2015). According to Habibah Lateh and Muniandy (2010), conducting seminars and courses that they could use in their future teaching methods could enhance environmental knowledge among lecturers.

Promoting the perspective on the educational understanding of sustainability in interior design is essential. Kang and Guerin (2009) claimed that basic knowledge of sustainability provides a platform for sustainable interior design educationally. Mirrahimi, Tawil, Abdullah, et al. (2010) reported that the inclusion of knowledge and first-hand experience on natural environments during the study creates self-awareness on sustainability among the academics and the students for better use of resources such as recycling, the use of waste management, energy efficiency, etc. As a result, they could develop a better understanding of the importance of saving the environment for future users. With this common aim, people are increasingly aware of the needs of confronting sustainability issues for the interior environment too. For example, in the office building as studied by Siew, Che-Ani, Tawil, et al. (2011), the practicality of natural ventilation in office buildings helps to reduce energy consumption and significantly decreased ventilation costs.

### **3.2 Varied samples**

Various researches have been focusing on sustainability to assist in developing responsibility relationship towards the environment to meet future human needs. In terms of the design process, many designers have put into concern on design strategies and solutions. For example, for energy saving, the use of natural ventilation helps to improve indoor air quality, and the use of waterless systems could encourage water efficiency. In the study reported by Roslan Talib and Mohd Sulieman (2011), sustainability in interior design requires an exploration of materials to incorporate an understanding of the environmental limits.

## **CONCLUSION AND RECOMMENDATION**

The results from the systematic reviews enable future researchers to further evaluate and assess the important role of sustainability in interior design education. Many of the above research papers have shown a significant concern on sustainability awareness to be applied both in the education and design industry field (Zalina Shari' and Mohd Fakry, 2006; Ruff and Olson, 2007; Roslan Talib and Mohd Sulieman (2011). There are over 85% of international publications on sustainability in interior design education. Hence, it creates a research gap of the Malaysia publication related to the importance of sustainability awareness in its Interior design education field. Due to its lack of literature and other resource factors, more papers and journals are, therefore, recommended for potential publication in Malaysia. Various studies related to interior design address the future approaches to its design solutions, such as identifying innovative alternatives for achieving energy efficiency, and ultimately target nil-zero-energy interiors that are a genuine customer and environmentally friendly (Rashdan and Ashour, 2017). However, these solutions to sustainability principles are implemented limitedly in the design stage.

Apart from interior design, many articles are associated with hands-on learning with the natural environments to create self-awareness and feelings of responsibility in conserving the environment and to integrate sustainability into life (Mirrahimi, Tawil, Abdullah, et al. 2010; Brković and Milošević, 2012). Future research should have sufficient and up-to-date reference materials to meet the needs of the relevant research field. Hence, support research between educators, students, and related professionals. Based on the systematic literature findings, researchers are better structured in the selection and extraction of unique subjects and are justified in the future.

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