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Evidence based practice for the built environment: Can systematic reviews close the research - practice gap?

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Abstract

A high performance building is designed and operated to minimise environmental impact whilst providing an indoor environment that maximises occupant health and comfort. The wealth of academic research into technical and non-technical solutions for high performance building continues to grow. However, industry utilisation of academic research is limited and inconsistent due to a number of factors. This situation is compounded by academics using a broad range of methodologies, which prevents a consistent and widely accepted body of knowledge being developed. These factors contribute to a widening research-practice gap. Evidence based (EB) practice is a potential avenue to close this gap. Applied in medicine, EB practice uses a rigorous, more systematic approach on which to base decisions and increase the likelihood of the desired outcome.

This paper will outline an approach being used to introduce evidence based practice to the built environment by a research project of the CRC for Low Carbon Living, an Australian based, industry focussed research collaboration. This paper will detail results from the first stage of the research, which assesses the applicability and suitability of using a systematic review process for built environment research. The paper will discuss the difficulties with such an approach to the built environment field, and proposes a 'realist synthesis' adaptation.

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Keywords: Evidence based practice; systematic review; built environment; well building; research practice gap; realist synthesis

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1. Background

1.1. Introduction

There has been a strong focus on energy efficiency in commercial buildings over the past 15 years. There is now a re-emergence of wider interest in the health impacts of buildings on occupants. This differs from the 'Sick Building Syndrome' which first gained attention in the 1970's attributed to the introduction of more energy efficient buildings which focused on limiting heat loss through airflow, resulting in air quality issues impacting occupant health [1]. A high performance building is now considered one that minimises environmental impact whilst providing an indoor environment that maximises occupant health and well-being. This renewed interest is resulting in formerly independent fields merging - built environment and public health /epidemiology.

This nexus brings opportunity to further research the next generation of buildings to address both low carbon and human health. It also brings challenges of merging different research styles and methodologies. To achieve this merger, the application of evidence based practice to the built environment sector is being explored. This will require changes to how research is both conducted and applied, and the research-practice gap to be minimised.

Whilst other sectors, such as medicine, public policy and education, have integrated evidence based practices [2] it has limited uptake in built environment. Healthcare design is the most advanced built environment sector merging these fields, adopting more evidence-based practices after Ulrich's seminal work from the 1980's that found the rate of patient recovery correlated with access to windows with views in hospitals [3].

This paper will first highlight the need for more evidence based practices in the built environment. It will detail initial findings from a preliminary analysis of built environment studies using a systematic review approach. This approach attempts to understand the current state of evidence around high performance buildings. The paper will draw the theory and findings together with a proposed framework for evidence review assessments to inform built environment activities.

1.2. Addressing the research practice gap in built environment

There is a recognized issue within the design and construction industry of the lack of feedback loops from post-construction and operation of buildings into up-front design, best known as the 'performance gap' [4, 5]. Without this feedback, continual improvements in practice and research are difficult. Problems related to the transfer of knowledge is a recognised cause for the existing disconnection between academia and practice [6]. This has resulted in a call to bridge the research practice gap through more collaborative research [7] and through the diffusion of research findings in a format easier for industry to apply [8].

This research is investigating both the 'knowledge gap' and 'practice gap' in order to develop industry tools to encourage more Evidence Based (EB) practices in the built environment, connecting relevant scientific research and industry practice. The proposed strategy for achieving this is shown in Figure 1.

1.3. What is evidence and how is it assessed?

'Evidence' implies a level of proof of relationship or causality and can take on many different forms and levels of quality. Evidenced based practices take the most reliable and rigorous evidence available and apply it to a situation for improved outcomes. Common definitions of forms of evidence based practice are listed in Table 1. The introduction of evidence based practice in medicine was to complement doctors' individual expertise with the best available clinical and research evidence, helping professionals to mitigate their bias and deliver accurate up to date treatments [9].

There are various methods for collecting and collating evidence. A literature review is the simplest form, where recent research on a particular topic is collated. Whilst such reviews should critically evaluate all aspects of a topic, they can be biased as certain pieces of evidence are selected to support a specific view, or justify the need for further research. To minimise this bias, systematic reviews can be conducted. This is a review of evidence using systematic, explicit and accountable methods [10] to mitigate bias. Reviewers assess multiple studies, such as Randomised Control Trials (RCTs), through a prescriptive review and quality assessment process to synthesize findings. Argued not as rigorous, scoping studies can also be used when assessing large volumes of studies to understand a non-bias