9. A QUASI-EXPERIMENTAL AND SINGLE-SUBJECT RESEARCH APPROACH AS AN ALTERNATIVE TO TRADITIONAL POST-OCCUPANCY EVALUATION OF LEARNING ENVIRONMENTS

INTRODUCTION

The past decade has seen a resurgence in the literature concerning the effectiveness of physical learning environments. A worrying characteristic of this research has been a lack of rigorous experimental methodology (Brooks, 2011; Painter et al., 2013). This may be due to the difficulties associated with randomly assigning students and staff to specific settings and problems associated with accounting for the complex intervening variables that come to play within the educative experience (Byers, Imms & Hartnell-Young, 2014). Nevertheless Brooks (2011) lamented the disparity between the ‘potential’ of contemporary learning spaces and the seeming lack of empirical evidence concerning the impact of these spaces on teaching and learning.

This is especially true for secondary school settings. A prominent literature review by Blackmore, Bateman, O’Mara, and Loughlin (2011) indicated that there is little empirical evidence addressing the connections between physical learning spaces, teacher pedagogical practice and student learning experiences and outcomes. Blackmore et al. suggested that much of the research has focused on the design and physical attributes of buildings. Indeed, there is strong empirical evidence connecting the effects of the physical attributes of the built environment; for example air quality, temperature, and noise on student learning (Higgins, Hall, Wall, Woolner & McCaughey, 2005). Yet, like Upitis (2009), Higgins et al. (2005) argued that there is little known about how and why the physical attributes of a given space influence the teaching and learning process.

This chapter explores the development of a quasi-experimental and Single Subject Research Design (SSRD) approach to investigate the effectiveness of physical learning environments in primary and secondary school settings. This approach is put forward as an alternative to traditional methodologies used in the post-occupancy evaluation of learning environments.
In general, the few empirical studies that have been conducted around the effectiveness of learning spaces have bolstered claims about the positive effects of technologically enabled or active learning spaces on student learning outcomes. Much of this work has centred on two influential projects: North Carolina State University’s Student-Centred Activities for Large Enrolment Undergraduate Programs (SCALE-UP) project, and Massachusetts Institute of Technology’s Technology Enabled Active Learning (TEAL) project. Both incorporated a redesign of the course, curriculum and pedagogies, in addition to redesigning the learning spaces in which introductory physics courses were held (Dori & Belcher, 2005). These projects found that students in these ‘studio physics’ learning environments had lower failure rates and higher levels of conceptual understanding compared to students taking the same course in traditional lecture-based environments (Dori et al., 2003). However, Brooks (2011) is of the opinion that both studies suffered from methodological issues that have detracted from their effectiveness in linking attributes of the learning space with student learning.

The multiple changes to assessment, curriculum and pedagogical approaches, in addition to the changes made to the formal learning space in the SCALE-UP and TEAL projects is a source of methodological concern. Brooks (2011) was of the opinion that these multiple changes translated to a lack of sufficient control of confounding variables. For instance, Brooks (2011) identified that neither study accounted for a host of exogenous factors related to student body composition (i.e. student cognitive ability) and endogenous factors related to different instructors and therefore pedagogical approaches and changes in assessment methodologies between the ‘experimental’ and control groups. It has been argued that this lack of control obscured the relationships between changes to the learning environment and consequential effects on learning outcomes (Brooks, 2011).

It is suggested here that a more rigorous and systematic research design is required to empirically bolster the nascent link between contemporary learning spaces and effects on teaching and learning.

RESEARCH DESIGN

The objective of this paper is to outline a viable and methodologically robust research design that can quantitatively examine and evaluate the causal links between changes in the physical learning environment and the subsequent effects on teaching and learning. This focus on causality would suggest that randomised experimental studies which represent the ‘gold standard’ of systematic evidence would be the ideal approach to adopt (Clegg, 2005). However, the nuances and ethical considerations of the schooling and tertiary education environments rarely support the requisite random assignment and absolute variable control of a randomised experimental