Studies in Educational Evaluation 58 (2018) 156–166

Contents lists available at ScienceDirect

Studies in Educational Evaluation

journal homepage: www.elsevier.com/locate/stueduc

# Evaluating teacher and student spatial transition from a traditional classroom to an innovative learning environment

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ARTICLE INFO

*Keywords:*
Learning environments
Pedagogy
Single subject research design
Classroom observation
Secondary school

ABSTRACT

Proponents highlight the potential of flexible and technology-rich spaces, referred to as innovative learning environments (ILEs), to shape activities and behaviours able to affect a desired pedagogical change. With much of the attention on the design of the physical learning environment, there has been a limited interrogation of what happens in the transition from traditional spaces to ILEs. As a result, this study applied the Linking Pedagogy, Technology, and Space (LPTS) observational metric through a single subject research design (SSRD) to understand how teachers, and their students, transitioned from traditional spaces to occupy an ILE. The application of statistical and visual analysis ascertained the degree of short- and longer-term pedagogical changes made by individual teachers and correlated these to effects on learning experiences. Corroboration with the thematic analysis of teacher focus group presents an account of the spatial transition between and the pedagogical return of different learning spaces.

## 1. Introduction

The past decade has seen significant public funding directed to the creation of contemporary or 'innovative learning environments' (ILEs) in schools (Dovey & Fisher, 2014; Mulcahy, Cleveland, & Aberton, 2015). ILEs are characterised as multi-modal, technology-infused and flexible learning spaces that are responsive to evolving educational practices (OECD, 2015). Dumont, Istance, and Benavides (2010) described how the re-imagination of school spaces through the creation ILEs are a response by systems and schools to changes brought by the dynamic transition from industrial to knowledge economies. It is suggested the shift from conventional, traditional classrooms to ILEs can engender pedagogies that are thought to better support students to become lifelong and self-directed learners capable of navigating the complexities of a technology-mediated and knowledge-based society (Mulcahy et al., 2015; OECD, 2013).

Despite the current interest and investment in ILEs, there is a lack of empirical data to adequately evaluate the claims purported around their impact on both teachers and students (Blackmore, Bateman, O'Mara, & Loughlin, 2011; Brooks, 2011; Gislason, 2010). Brooks is critical of the overt theorising around these new spaces, with a "dearth of systematic, empirical research being conducted" on their impact on teaching and learning (p. 719). For Painter et al. (2013), this lack of evidence stems from the few methodologies and metrics able to isolate and then assess how different learning spaces affect both teachers and students. Besides a handful of recent studies (for examples see Alterator & Deed, 2013, 2016; Deed & Lesko, 2015) there remains little understanding if, or how, the transition from traditional classrooms to ILEs affects teacher practice and resulting student learning experiences (Blackmore et al., 2011).

This study aimed to discover what occurred when a group of teachers and their students transitioned between conventional or traditional classrooms, to an ILE. Over a two-year period, the study evaluated the immediate and longer-term impact of the occupation of these different learning spaces. The intent was to document what occurred when teachers and students navigated such a spatial transition. A time-series quasi-experimental approach facilitated by a Single Subject Research Design (SSRD), compared the activity and behaviour of the same teacher ($n$ = 9) and classes ($n$ = 12) through a repeated measures observational metric, and follow-up teacher focus groups. In a departure from more traditional techniques, the novel Linking Pedagogy, Technology, and Space (LPTS) observational metric recorded, compiled and produced a proportionate visual breakdown of the observed lesson across five domains: pedagogy, learning experiences, communities of learning, and student and teacher use of technology.

Longitudinal analysis of quantitative data from the LPTS metric enabled comparison of student and teacher activity and behaviour within a conventional or traditional classroom (baseline) and ILE

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https://doi.org/10.1016/j.stueduc.2018.07.004
Received 12 December 2017; Received in revised form 24 March 2018; Accepted 11 July 2018

(intervention). A combination of visual and nonparametric analysis identified those micro changes and trends, across the five domains, of individual teachers through and beyond the spatial transition. The subsequent thematic analysis of the follow-up teacher focus group evaluated the factors, spatial or other, that underlined those significant changes to the nature of teaching and learning in both spatial layouts. This multidimensional analysis presents a holistic teacher account of the pedagogical impact of different learning spaces.

The Drivers in the Investment in Innovative Learning Environments

The narrative around the need to prepare learners for the 21st century has seen learning spaces become a matter of policy in many countries (see MCEETYA, 2008; New Zeland Ministry of Education, 2014; OECD, 2013). The drivers of evolving educational policies and the integration of digital technologies altering the perceptions of what constitutes effective teaching and learning have prompted some to question the efficacy of the conventional or traditional cellular classroom model (i.e. Alterator & Deed, 2013; Benade, 2016; Dovey & Fisher, 2014). The traditional architectural view of the "classroom-as-container" model (Mulcahy, 2015, p. 500) with its fixed instruction settings (in groups or rows) is said to restrict teacher and student activity and behaviours (Fisher, 2006; Tanner, 2008; Upitis, 2004). Dovey and Fisher (2014) surmise that this inhibits the ability for teachers to easily enact a broader spectrum of pedagogies as dictated by current policies that favour a greater incidence of student-centric and technology-enhanced learning.

The rationale behind this critique is the assumption that the educational spaces are an 'active agent' in the teaching and learning process (Oblinger, 2006). More conventional, traditional spaces are said to be ideal for teacher-centric pedagogies that favour didactic, linear and standardised instruction (Dovey & Fisher, 2014; Dumont et al., 2010). These pedagogies support the dissemination of knowledge to students engaged in surface learning experiences that are typically focused on recall and memorisation of 'the basics' (Hattie & Donoghue, 2016; Theisens, Benavides, & Dumont, 2008). Benade (2016) and Dumont and Istance (2010) highlighted that the current narrative sees these pedagogies and learning experiences deemed inadequate to prepare today's students to be life-long learners of the future. Mulcahy (2015) suggested this misalignment as led some to postulate the potential benefits in the "re-consideration of learning and the spaces in which learning takes place" (p. 500).

The narrative around the reconsideration of the school learning spaces stems from the premise that ILEs are, somehow, able to facilitate a much wider range of pedagogical practices and learning modalities, than a traditional classroom (Dovey & Fisher, 2014; Lippman, 2010; Thomas, 2010). It is suggested that the affordances (digital and spatial technologies) of an ILE are aligned with a pedagogical orientation that sees teaching be a more active, collaborative, and responsive endeavour (Dumont & Istance, 2010; Theisens et al., 2008). Such an orientation is thought to facilitate those cognitive, metacognitive and collaborative experiences that are required for students to transition from surface to deep learning (Hattie & Donoghue, 2016; Theisens et al., 2008).

Empirical Evidence that Learning Spaces Make a Difference

There are authors that have considered the theoretical view that a learning space's affordances (those features that facilitate the actual use), its physical design, and associated technologies can enhance or hinder student learning by their effect on teacher pedagogical practice (Dovey & Fisher, 2014; Gislason, 2010; Halpin, 2007; Upitis, 2004; Woolner, Hall, Higgins, McCaughey, & Wall, 2007). In their literature reviews, Blackmore et al. (2011) and Painter et al. (2013) note the considerable contribution qualitative case studies and conceptual analysis have made in establishing this nascent field. However, both reviews, along with Brooks (2011), Gislason (2010) and Higgins, Hall, Wall, Woolner, and McCaughey, (2005), highlight a commensurate dearth of empirical, quantitative studies that rigorously evaluate the impact of different learning environments on teaching and learning.

A small number of empirical studies have measured the impact of different spatial layouts (exemplars include Author, 2017; Authors, 2014a, 2016c; Brooks, 2011; Tanner, 2008). The design of each has attempted to account for those intervening variables inherent in the school setting (such as the teacher, class composition, and cognitive ability). Collectively, these findings present a possible correlation between different classroom environments and student learning experiences and academic outcomes. However, due to their objective nature, these studies do not provide a deeper understanding of how and why the physical attributes of these different spaces supported or hindered the teaching and learning process to affect these measured outcomes (Blackmore et al., 2011; Gislason, 2010).

## 2. The study

### 2.1. Context

The study took place at a secondary boys' school, in an Australian city, that had engaged in a longitudinal evaluation of the impact of different learning environments on teaching and learning. Earlier studies at this site focused on understanding how and why different learning environments affect teaching and learning in a secondary schooling context. The process began with a modest refurbishment of a single classroom space and a sample of three teachers, to devise, trial and refine potential methodologies and methods to isolate and evaluate the effect of a spatial change (Authors, 2016c). In the following years, a series of studies, expanded regarding scope, sample size and statistical rigour, not only identified the design, materials, and technologies that worked (and those that did not), but also developed the knowledge and skills of the teachers. The transition from conventional or traditional classroom layouts to the occupation of ILEs corresponded with statistically significant improvements in student attitudes in the effective utilisation of technology, the incidence of more active and responsive learning experiences, and enhanced behavioural and cognitive engagement (Authors, 2014a, 2014b, 2016a, 2016b,). These changes correlated with statistically significant improvements in English and Mathematics academic achievement (average $g = +.53$). Furthermore, these studies found an average 9% variance in achievement attributed to the different learning environments (when various confounding variables were controlled) (Authors, 2014a), supporting the earlier findings of Tanner (2008). The resulting evidence base and corporate understanding informed the design, construction and occupation of the "Creative Precinct", which is the subject of this study.

The Creative Precinct was the school's first significant redefinition of what constitutes a responsive learning environment. It presented a major departure from previous spaces at the school, with its introduction expected to challenge many teachers perceptions of pedagogy (Gislason, 2010; Higgins et al., 2005). While the Creative Precinct was a design-oriented complex, its spatial construction followed the principles and practices common to many ILEs. Thus, its inhabitation offered a unique opportunity to evaluate what occurred during teacher and students' spatial transition.

Understanding how teachers navigate the transition process from traditional classrooms and evolve their practice in the inhabitation of ILEs is rarely articulated in the current narrative around school learning environments. Proponents of ILEs often highlight how the spatial transition will effect significant changes in pedagogies, but little explanation is forthcoming in exactly how, or the supports required for, this process to occur In their review, Blackmore et al. (2011) found very few studies that focused on understanding how both teachers and students navigate this process. The contributions of Alterator and Deed (2013); Alterator & Deed, 2016 and Deed and Lesko (2015) suggested that any pedagogical changes that accompany a spatial transition from traditional to ILEs are mediated by teachers' technical proficiency (subject-matter, curriculum and pedagogy), adaptability, and interpersonal knowledge. The mediating factor of a teacher's knowledge base and personal characteristics is echoed by both Lackney (2008) and