

The Architectural Design of Learning Environments: What Happens when Teaching?

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Abstract

In New Zealand, and internationally, the types of school building structures in some cases are being changed to large flexible teaching spaces which accommodate 50 to 160 plus students and have multiple teachers. Some New Zealand schools are newly built, where teachers may have input into the design, whilst others are adapting existing traditional single teacher classrooms into larger flexible learning spaces. This article explores the perceptions of eight teachers from six New Zealand schools where there were traditional single teacher classrooms and six teachers who were teaching in a newly built innovative learning environment New Zealand school with large flexible learning spaces. It seeks to uncover the different supports and barriers that these teachers found when teaching, particularly in the two core curriculum areas of reading and mathematics.

1. Introduction

In New Zealand, and internationally, there have been moves to facilitate different pedagogical practices which may be better implemented in different architectural styles of school buildings. This has resulted in the recent change to building large open flexible classroom spaces in primary and some secondary schools. Different terms have been used to describe these larger architectural spaces, such as; modern learning environments, innovative learning environments, superblocs, and flexible learning spaces. In this article they will be referred to as innovative learning environments. Some of these spaces are designed with smaller withdrawal areas for teachers to work with groups of students. How this change to different architectural designs in learning environments impacts on teaching and learning is a key element. There have been varying views on these radical changes to school architectural design. This article explores the practices and perceptions of eight teachers from six primary schools with traditional single-teacher classrooms and six teachers from a new primary school with large innovative learning environments that are all situated in New Zealand.

Two of the key curriculum areas in schooling are literacy and mathematics where achievement outcomes are

measured and reported upon both internationally and nationally. For example, international studies, such as the Programme for International Student Achievement (PISA) [1], have continued to report an achievement deficit in mathematics for all New Zealand children, and particularly those children from disadvantaged minority cultures. The 2015 PISA [2] results pointed to a continuing downward trend for New Zealand children from the Indigenous Māori ethnicity. Māori are the largest non-New Zealand European group in New Zealand. Additionally, there were decreases in achievement from students in the majority New Zealand European ethnic group, Asian students and those from low socio-economic catchments.

A similar pattern has occurred in reading. Internationally, reading achievement of students in countries such as Australia and England have significant percentages of low achieving students. This has been evident in the findings from the 2011 Progress in International Reading Literacy Study of 10 year-old students' reading achievement [3], [4], [5]. In New Zealand, more highly represented in this underachievement were Māori students, Pasifika students (a term used to encompass students deriving from a range of Pacific Islands, such as Samoa, Tonga and Fiji), and children from low socioeconomic families [3]. This analysis of data continues to indicate the present schooling system is failing to meet the needs of some sectors of New Zealand society. Although the change to collaborative teaching in large flexible learning spaces is impacting on many students and teachers in New Zealand primary and secondary schools, there appears to be a dearth of evidence to suggest that this change will provide any further advantages to Māori, Pasifika and lower socio-economic students. These at risk students appear to have been poorly served by the prior and current education system.

This article seeks to better comprehend if there are any changes to the ways the core curriculum subjects of reading and mathematics are taught in the traditional single teacher classrooms compared to the newly developed innovative learning environments. In particular, by investigating the experiences and perceptions of 14 teachers, the research has sought to explore the teaching strategies, assessment and professional development in

mathematics and reading occurring in traditional single teacher classrooms and innovative learning spaces. The focus was to uncover whether a change in the environmental landscape led to differing teaching strategies and practices in reading and mathematics.

From a social constructivist theoretical perspective of reading and mathematical development, learning occurs during interactions amongst learners and with guidance from teachers [6]. Bronfenbrenner and Mahoney [7] suggest, when exploring learning and human development, that teaching which focuses simply on the process skills of mathematics and reading can be restricted, and developing contextually relevant learning is a key driver in student engagement and success.

2. Literature

2.1 Architectural design

In New Zealand, and in many other countries, the architectural design of school buildings has traditionally focused on single teacher classrooms. However, during the post-world war two period of the 1960s to 1980s in the United Kingdom and in New Zealand there was a move to design schools that had open spaces so children would have extra opportunity to move around, work collaboratively and engage with more than one teacher. These spaces were often termed ‘open plan’. This era consisted of variations of teaching space design from those that had wide-open spaces, to others that provided variable spaces with flexibility to withdraw groups into quieter areas [8]. Over time these ‘open plan’ teaching spaces were re-adapted back into single teacher classrooms, due to both teacher and parental dissatisfaction.

School building design once again has become a focus for governments and educators internationally. This has been prompted by calls for future focused school building environments to accommodate evolving pedagogical practices such as critical thinking, communication, creativity and problem solving [9]. The Organization for Economic Cooperation and Development (OECD) [10] has used the term innovative learning environments to describe this organic all-embracing concept of flexible learning spaces that are technology infused and multi-modal. In the UK, these types of schools are sometimes referred to as ‘superblock’ schools. Clegg and Williams [11] contend that the ever-decreasing government budget in schooling has necessitated a streamlining of design plans of schools in order to trim down square footage and simplify the design, with the ultimate aim of lowering the cost envelope. A further consideration, when investing money into new school buildings, is future proofing the new designs so they will be adaptable and user appropriate for upcoming generations. The longevity of a school buildings may be problematic as changing pedagogical approaches to teaching continually evolve. Therefore, there may be some justification for simple architectural designs that allow for some degree of flexibility. In my research with colleagues [12, 13] on innovative learning environments in New Zealand schools, frequently

principals and teachers had been consulted in the layout and planning of newly built innovative learning environment schools and buildings. However, it did not appear to be evident in our findings that future proofing was considered.

2.2 Collaborative teaching

The pedagogical change for teachers to work collaboratively as they co-teach together requires the teachers in these innovative learning environments to agree to mutually developed goals and foster shared beliefs in ways that will promote an effective and harmonious learning environment. Co-teaching and developing positive working relationships with fellow teachers and a much larger number of students are underpinned by a co-operative process [14]. These collaborative teaching strategies allow the opportunity for teachers to plan and implement co-teaching strategically to meet explicit student learning needs of a wide range of learners. For some teachers, the temptation is to simply work in the same space and teach independently, similar to their previous teaching experiences in a single teacher classroom. This was evident during the ‘open plan’ era in the 1960s to 1980s where eventually temporary walls were made using shelving and other ways of ‘fencing off’ a personal teacher space.

Gains have been recognized for students in a co-teaching environment as both teachers and students can benefit from multiple perspectives on the curriculum. For some students there have been gains in student social interactions which can have a positive impact on their social, emotional and learning skills [15]. Collaboration amongst a cohesive team of teachers has the capacity to considerably advance how teachers assess, plan, teach and grow professionally as they can reflect on a day-by-day basis on the effectiveness of their teaching strategies and the way they relate to learners. They can co-jointly problematize ways to support the learning and social outcomes for all learners [16]. When teachers participate in a higher level of collaborative teaching and learning processes, they are more likely to facilitate an effective learning environment for their students.

3. Theoretical perspective

Bronfenbrenner [17] described the wider environmental issues that influence students and their learning as ‘significant others’. This ecological approach to understanding how students learn heightens an awareness of the inter-connections, and the critical nature of developing positive and effective relationships which can have a dynamic flow-on to the phenomenon of learning. The level of influence amongst these various wider systems and their degree of impact on the student’s learning provide a complex web of factors that may put up barriers and/or provide supports. At a more direct level, the students are immersed in numerous face-to-face relationships with teachers, teacher aides and peers within their learning environment.

These premises align with sociocultural theory [6] which recognizes the critical nature of acknowledging and respecting students' social and cultural backgrounds. Students' prior knowledge and cultural ways of being are momentous factors that can impact on the way they learn best and the contextual significance of the learning. Vygotsky's [6] sociocultural theory allows educators to develop wider perspectives about the critical circumstances that can enhance learning.

4. Research objectives and methodology

The aim, in this study, was to focus on how teachers in seven New Zealand primary schools were implementing strategies to engage students in learning, particularly in reading and mathematics. The research investigation was a multiple case study which explored the perceptions of fourteen teachers of students in primary (five to thirteen year-old students) and intermediate schools (eleven to thirteen year-old students).

There were eight teachers from six schools who had traditional single teacher classrooms and six teachers from one school that was a newly built innovative learning environment school. At the innovative learning environment school there were 4 to 5 teachers with approximately 130 students in each of these large flexible spaces. The sizes of the school rolls ranged from 110 to 628. The ethnic composition of the seven schools comprised 40 percent to 80 percent New Zealand European; 9 percent to 28 percent Māori; 3 percent to 25 percent Pasifika; and 3 percent to 14 percent other ethnicities. The teacher interviews were approximately 45 minutes in length, were audiotaped and later transcribed.

The emerging themes were categorized into initial codes. Afterwards, open coding was implemented to consider the coding categories. Next, axial coding provided a second order of analysis where any links between themes and codes were identified [18]. This allowed for emerging ideas to be separated. The final stage used selective coding to highlight the core concepts that had reappeared during the course of the analysis.

5. Findings

At all of the schools the teachers had reading and mathematics programmes in place. Overall, the teachers in the traditional single teacher spaces and the innovative learning environments used similar resources and adopted very similar assessment practices in reading and mathematics. The three main themes that emerged were collaborative teaching, professional growth in teaching and grouping of students.

5.1 Collaboration

In the innovative learning environments, all the teachers commented on the importance of working well in a team, rather than just having an emphasis on curriculum knowledge and effective pedagogical understandings. For example, one teacher said:

It is how you work in a team and this is really important. At the heart of it, is the knowledge of best practice and teaching and learning and how open you are to learning as well.

The need for close collaborative planning was very tiring, as reported by all the teachers in the innovative learning environments, particularly negotiating ways of working. A teacher explained:

We need to be very flexible and adaptable because things change all the time. In the first half of the year I was exhausted. It was much more tiring. I guess there is less down time and you are not just dealing with 25 kids. I might see 80 kids in a day, different kids in maths and reading.

Another teacher also described this:

What is really time consuming is the conversations, because we talk about everything. You can't just decide, oh, I am going to spend 10 more minutes on maths today. You have to negotiate it. Everything is talked about, because we have so many children.

The teachers in the traditional single teacher classroom schools did not have the issue of time constraints in needing to negotiate and discuss, and were able to make autonomous professional judgements in the delivery of the teaching of reading and mathematics. These teachers were able to adapt their reading or mathematics teaching and make the sessions shorter or longer as they wished.

5.2 Professional growth

One of the advantages that the teachers in the innovative learning environments found was that they were able to observe their colleagues teaching and learn new strategies and skills. A teacher explained:

I saw another teacher trying this different way of doing it [grouping children in mathematics]. I found it interesting and had a go. It is where you have the same learning intention but you have three tiered problems. You might have the first two groups using two digit numbers, then three digit numbers, then word problems. You do a lesson on it with the whole class and then they can choose what level they would like to have a go at. Then I might pull a group and help them. So now I am doing a bit more of a combination of the two.

One of the teachers from the traditional single teacher classrooms was trying to improve his teaching without any professional development being offered at his school. He had the confidence to try this on his own, without asking for collegial support. He said:

The whole time at my school I have not done any PD [Professional Development] in maths. It really has been a case of trial and error. Sometimes it works and sometimes it doesn't and I have just tried to critique as much as possible. I would like to argue that there is not a heck of a lot of PD in maths out there.

Whilst the teachers in the innovative learning environment school did not have access to formal professional development, they could observe and enter into dialogue with their co-teachers in real time classroom interactions and observations.

5.3 Grouping

Similar to the teachers in the traditional single teacher classrooms, the teachers in the innovative learning environments usually taught mathematics and reading in smaller groups. The groups contained only the students within an innovative learning environment. The mathematics or reading teacher was not necessarily the home base teacher of the students. In the innovative learning environment, students were assigned a home base teacher for the year who had the role of overseeing the well-being and achievement of the students in the home-base. However, in the traditional single teacher classroom, the teachers taught all of the students within their own class. Two teachers from the traditional classrooms had previously been part of interchanges with other classes. They had opted out of this, reporting that keeping their own classes provided flexibility in timing, being able to refer back to maths learning in other curriculum areas and ensuring children did not feel bad, if they were placed in a bottom class for the year. A teacher explained:

We plan alone but we have, in the past, had interchange, Year 7 and 8. ... the bottom class tends to be behaviourally challenged, partly because they all have the grumps because they are in the bottom class. Research has shown that maths interchange really only works for the top kids. So I thought let's fling away the interchange and keep our own kids and see what happens. ... I actually like it.

One of the major challenges for the teachers in the innovative learning environments with over 100 students, was collecting knowledge about each child to group them appropriately. For example, home-base teachers have the responsibility for individual testing but may not actually work with the child on a daily basis. Making the overall teacher judgements necessary for formative and summative assessment required input from all the teachers in the innovative learning environment. A teacher commented that this was not ideal as it took considerable time and added complexity.

The thing we find is that when we come to form an OTJ [Overall Teacher Judgement] that we have to do, the home teacher does the JAM [a test in mathematics] ... So they then possibly have fresh eyes looking at that child and another teacher is their strategy teacher and another teacher is their knowledge teacher and we all put forward anecdotal notes.

Another added complication for teachers in the innovative learning environments was how to logistically facilitate parent/caregiver - teacher interviews. A student may have a home room teacher, a different teacher for mathematics and a different teacher in literacy and possibly in other curriculum areas. With about 130 students in the innovative learning environment and four to five teachers, plus two to three teacher aides, if all of these teachers were to meet with the parent/caregiver, the amount of time to complete all of the interviews would be much increased in comparison to a teacher in a single teacher classroom.

6. Conclusions

In summary, there appeared to be an added complexity when the teachers were co-teaching with another three or four teachers, which added a level of frustration to some of the teachers in the joint decision-making processes needed when working in an innovative leaning environment. This was apparent in the co-joint assessment and planning which appeared to be undertaken in meetings with all teachers from a particular innovative learning environment present. For the teachers in the traditional single teacher classrooms, this co-joint planning might still occur but from what our research found it was not to the same extent as to that of their colleagues in innovative learning environments. Furthermore, the day-to-day management of timing sequences of teaching and changeovers to curriculum and content within a multi-teacher learning environment was another complication for individual teachers, as this needed to be continually negotiated. The flexibility to spontaneously use a teachable moment appeared to be thwarted.

Although the multi teachers in the innovative learning environments had advantages of day-by-day observing their colleagues teach, they appeared to be frustrated at the lack of autonomy they had as a teacher on a daily basis. From the findings of this research study there did not appear to be differing teaching strategies between the teachers in the traditional single teacher classrooms and those in innovative learning environments. Also, it was not evident that the architectural type of teaching space encouraged any differing practices in regards to contextually relevant teaching strategies and content in mathematics and reading. Although, the type of spaces built for teaching and learning may differ in time and place, the quality of the teaching and learning is very much dependent on the teacher and the leadership within the school.

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8. References

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