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Innovative Learning Environments and spaces of belonging for students with disability in mainstream settings

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ABSTRACT

In many schools across Australasia, single-cell classrooms have been replaced by 'innovative learning environments' (ILEs). This redesign of education spaces has had pedagogical and physical ramifications for students and teachers. This qualitative study, conducted in New Zealand and Australia, investigated how students with disability responded to ILE design. Students with disabilities have, in traditional classrooms, often been reported to be isolated and marginalised. This study sought to examine if the ILE design in its material, pedagogical and relational space supported students with disability in developing a sense of belonging at their schools. The analysis of interview data utilised the Spaces of Belonging Framework. Findings highlight that belonging was facilitated for students with disabilities across all three domains of the Framework. Skilful ILE design can promote the inclusion of students with disability and support academic and social outcomes. This enables a sense of connectedness to the school environment.

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Introduction

Policymakers, architects, designers and education leaders have a unique opportunity to create inclusive and innovative spaces when establishing new school buildings or refurbishing old ones (Page et al., 2023). Recognising the potential for form to follow function, the Organisation for Economic Cooperation and Development (2013, 2015, 2017) have promoted schooling designs that leverage the affordances of spaces so that pedagogy can be creative and flexible to enhance student learning. By reimagining school building design as 'Innovative Learning Environments' (ILE) (OECD, 2017) and enabling design to serve as a lever for change, it has been argued that schools can be transformed from locations where education policy is enacted to mechanisms of policy operationalisation (Wood, 2019). This article addresses the question: How does the ILE space influence a student with a disability's sense of belonging? There is a need for further research into how ILE spaces can be designed with inclusive education in mind as, while schools

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continue to be built and redesigned within the ILE philosophy, work to understand this notion has been limited (Charteris et al., 2021a; Page & Davis, 2016).

In recent years, there has been much interest regarding how ILE can support inclusion (Page et al., 2023). This aligns with a shift in recent years. The concept of inclusive education has morphed from an emphasis on students with disabilities to a recognition of the importance of providing education to all (Anderson & Boyle, 2019). However, the definition of inclusive education remains hotly debated and subject to political contention (Armstrong, 2017). Despite its significance, there is no universally accepted definition. Even within the internationally recognised Convention on the Rights of Persons with Disabilities (United Nations, 2016), the definition is filled with subjective language (Graham, 2020). Inclusive education can be understood as placing students with additional educational needs in a unit within the school or providing specialised facilities to meet their needs (Haug, 2017). Alternatively, some argue that true inclusive education is achieved only when all students are actively engaged and valued members of their local school communities (Slee, 2018). In this article, inclusion in ILE is understood to mean that all students can access learning opportunities within the same educational environment, irrespective of their educational needs, through the adoption of pedagogies and practices that align with the principles of inclusive education (Charteris et al., 2021). As Anderson et al. (2014, p. 24) observe, this necessitates that 'all students must be able to participate, have opportunities to achieve and be valued'.

It follows that the notion of 'belonging' is integral to inclusion, as positive relationships with supportive adults and peers can enable sustained engagement with learning and an experience that school is a safe and supportive environment (Page et al., 2021a).

We commence with an overview of ILEs as purpose-built or restructured schooling spaces that differ from the traditional design of single-cell classrooms. Secondly, the relationship between belonging in schools and connectedness with learning for *all* students is highlighted. Thirdly, we emphasise how belongingness is particularly important for consistently marginalised students such as those with disability. Finally, we present the model that can be adapted for use in ILEs to explore the sense of belonging for students with disability. The article concludes with a proposal that the 'Spaces of Belonging Framework' can support a robust approach to inclusion in ILE, specifically student attachment, sense of community and engagement as three critical facets of belonging.

Innovative learning environments

While it is recognised that there is no causal relationship between the physical environments and educational activities or learning outcomes (Blackmore et al., 2011), there is an established relationship between the school setting and subsequent practices that take place in them (Woolner et al., 2018). Different schooling spaces have been recognised to encourage certain pedagogical and social practices, while other designs create impediments (Blackmore & O'Mara, 2022). Examples of enabling pedagogical and social practices include sharing and ownership of the learning space to facilitate learning, cooperative practices amongst teachers to enable engaging student lessons, and team teaching that affords greater capacity to individualise student learning.

An ILE typically refers to a modern approach to education that incorporates various elements designed to enhance learning outcomes and student engagement. These environments often utilise technology, flexible learning spaces, collaborative learning methods and personalised instruction to cater to students' diverse needs and learning styles (Page & Davis, 2016). An ILE is defined as

> the product of innovative space designs and innovative teaching and learning practices. Only when these two phenomena are successfully merged do we produce an innovative learning environment. A design may be deemed 'innovative' but only becomes an ILE once its inhabitants (teachers and students) teach and learn innovatively within them. (Mahat et al., 2018, p. 8)

Space design is the physical facility that provides flexibility in teaching and learning and is argued to provide a catalyst for a full array of teaching and learning styles (Blackmore & O'Mara, 2022). Innovative teaching and learning practices develop what is commonly referred to as twenty-first-century learning skills: creativity; collaboration; communication; and critical thinking (Mahat et al., 2018). Teachers take on a more significant role as facilitators of students' personalised learning, and teachers collaborate in planning and/or co-teaching activities (Liljestrand, 2024).

In contrast, traditional open classrooms are characterised by large, open spaces where students from multiple grade levels are grouped together. They often need a more structured layout and technological integration found in ILEs (Byers et al., 2018). While both environments emphasise student-centred learning and collaboration, ILEs leverage advanced educational tools and strategies to a greater extent.

The key differences between the two can be summarised not only by the focus on technology but also by

Flexible Learning Spaces: Innovative learning environments often feature flexible layouts that can be easily reconfigured to accommodate different learning activities and group sizes. Traditional open classrooms may need more flexibility in terms of physical layout (Blackmore & O'Mara, 2022).

Personalised Learning: Innovative learning environments emphasise personalised instruction tailored to individual student needs and interests through adaptive learning platforms and data-driven insights. Traditional open classrooms may have more standardised approaches to teaching (Benade & Jackson, 2018).

Teacher Role: In ILEs, teachers often serve as facilitators and guides, supporting students' exploration and discovery rather than delivering lectures. In traditional open classrooms, teachers may assume a more conventional role of imparting knowledge and directing classroom activities.

Collaboration and Creativity: ILEs promote collaborative learning, problem-solving and creativity through group projects, peer feedback and hands-on activities. While traditional open classrooms also encourage collaboration, the emphasis on structured learning activities may differ.

According to Deppeler et al. (2022, p. 604), a fundamental learning principle in the ILE framework is based on the social nature of learning. It assumes collaborative arrangements with a range of partners. Aligned with this principle, architectural design thinking has emphasised open, aesthetically pleasing and comfortable learning spaces that can be flexibly organised for different purposes, pedagogical approaches and student

learning opportunities (Benade & Jackson, 2018). Flexible organisation includes the dynamic use of space, furniture and technology alongside corresponding shifts in pedagogy. Many ILEs are refurbished or new school buildings with state-of-the-art technology and a range of designs, including nooks, break-out rooms, and large flexible spaces intended for collaborative teaching and learning (Campbell, 2020), often with a smooth transition between indoor and outdoor space.

Despite increased research interest in these configurations over the last two decades, more needs to be explicitly written about the affordances and constraints of inclusive education in ILE schooling spaces (Benade, 2019; Page & Charteris, 2019; Page & Davis, 2016). Additionally, a dearth of research investigates the experiences of students with disabilities, their teachers and disability support staff within ILEs (Page et al., 2023). This article redresses the scarcity of literature in this inclusive education area as we examine the perceptions of students with disabilities and the staff who teach them. We asked about their experiences of teaching practices, the use of space and relationships that form within ILEs, which impart a sense of belonging and ultimately influence engagement and learning.

Sense of belonging

Belonging is essential for psychological well-being, and schools offer opportunities to address this construct with children and young people (K. Allen et al., 2016). Despite belonging being positively related to better academic outcomes, prosocial behaviours and psychological well-being, ultimately leading to improved life outcomes (K.-A. Allen et al., 2021), the Organisation for Economic Cooperation and Development (OECD, 2019) reported that globally, one in three students do not feel a sense of belonging to their school and this trend is on the rise. Figures from Australia indicate that students experience a poorer sense of belonging when compared to other students across the OECD (De Bortoli, 2018), while students in New Zealand are on par with their OECD peers (Berryman & Eley, 2019). Concerningly, however, in both countries, fewer students feel a sense of belonging at school today than they did a decade ago, and it has been predicted that this number will increase (Berryman & Eley, 2019; De Bortoli, 2018).

The research literature indicates that school belonging is a multi-dimensional concept. Scholars have described belonging as a feeling of attachment (Ibrahim & El Zaatari, 2019), a sense of community (Barber & Schluterman, 2008), a sense that peers and adults care about an individual (Liu et al., 2020), a feeling of safety and fairness (Pikulski et al., 2020) and school engagement (Libbey, 2004). In essence, school belonging pertains to a student's sense of affiliation with a school that is influenced by individual, relational and organisational factors (K. Allen et al., 2016). Given the complexity of factors associated with the notion, it is perhaps not surprising that many schools find that creating a sense of belonging for all students presents a significant challenge. Yet, given the essential role school belonging has in educational success, these figures should not be ignored.

A substantial body of research indicates that positive student–teacher relationships are significant for a sense of belonging at school (K.-A. Allen et al., 2021). Rose and Shevlin (2017) reported the findings of a comprehensive study where they collected 120 students' voices to explore perceptions of acceptance (favourable reception) and belonging (secure

relationships and/or affinity) in mainstream education settings. The results indicated that effective teaching support is influential in developing belonging and a sense of acceptance in the school environment. It is worth noting that some early definitions of belonging were associated almost solely with teacher support (for example, see Libbey, 2004). While our understanding of the construct has since moved beyond this narrow conceptualisation, it emphasises teachers' significant role. The importance of teacher support is underpinned by proactive school leadership, which is a consistent predictor of both student achievement (Sailor, 2016) and school culture (Piotrowsky, 2016). It follows that leadership teams can work to create sustainable cultures that assume responsibility for promoting supportive and inclusive education practices that foster a sense of school belonging (Carter & Abawi, 2018).

Sense of belonging: students with disability

Belonging, as a construct, is pertinent for all students at school, and each student will experience belonging differently, as learning contexts are unique. Research has shown that disability can have a significant impact on students' experiences and perceptions of belonging at school (Pesonen et al., 2016), and while this is perhaps unsurprising, the finding does raise some concerns. The centrality of acceptance and belonging to facilitating positive experiences of inclusion of students with disability in mainstream school settings cannot be ignored (Alesech & Nayar, 2020). If students with a disability do not feel they belong, they are unlikely to thrive.

As noted earlier, teachers and school leaders have a pivotal role to play. This is evidenced in the five key areas highlighted by Alesech and Nayar (2020) that can facilitate a sense of belonging for students with a disability at school. These areas comprise i) a positive attitude (a culture accepting of students with disability); ii) an individual approach to teaching and learning; iii) teacher characteristics, such as an understanding of, knowledge of and confidence in working with students with disability; iv) effective teaching and learning that allowed inclusive participation for all; and v) an understanding and recognition that every child has the right to participate in all school activities. In a further interrogation of the teacher's role in increasing a student's sense of belonging, the same authors revealed a set of critical skills that included effective classroom management, a constructive approach to problem-solving and effective planning to address students' specific disability needs (Alesech & Nayar, 2021). The key areas and skills highlighted by the authors here are significant, and their importance should not be dismissed. A growing body of research points to positive experiences in inclusive school settings being one of the strongest determinants of school belonging for students with a disability. This is critical, as a sense of belonging at school predicates a sense of belonging outside of school (Korpershoek et al., 2020), something students with disability generally experience at lower rates than their peers without a disability (Pesonen et al., 2016).

Moving beyond the inclusion/exclusion debate

Inclusive education, as a term, has salience within educational discourse globally. Its prominence in legislation, policy, funding models, university degrees, professional

learning and scholarly research attests to this (Slee, 2018). Despite this, inclusive education as a construct remains a contested term that 'lacks a tight conceptual focus' (Tiernan, 2022, p. 883), and, as a result, it is used in a myriad of ways. An example of this is reflected in the positioning that locates inclusive education on a continuum. Writers argue that while access to and participation in schooling alongside peers is valuable, it should not come at the expense of individualised instruction and specialist interventions provided by trained staff, and this can and should happen under the umbrella of inclusive education (Tiernan, 2022; Kauffman et al., 2018). Slee (2018) laments this notion and argues that any practice that excludes or segregates cannot be considered inclusive. Therefore, inclusive education can and should only mean that all students are educated together. The debate is complex, and a binary can be constructed between 'inclusion for some' (where students can be excluded from being educated with peers) and 'inclusion for all' (Leijen et al., 2021, p. 1). (For further exploration, see Leijen et al., 2021).

At its core, inclusive education is about social justice and fairness (Shyman, 2015), a way of thinking that educates all students together and celebrates diversity. It grew from a desire to disrupt education practices that privilege particular groups of students and disadvantage others (Skrtic, 1995). Inclusive education challenges the marginalisation of students based on 'organisational and curricular structures that categorise learners based on pre-determined judgements about who they are and what they can and should learn' (Florian, 2019, p. 701) and places value on diverse perspectives and ways of knowing. Despite decades of being at the forefront of educational discourse, inclusive education remains an elusive ideal, with research evidencing inconsistent and ineffective progress in recent years (Leijen et al., 2021). In some countries, such as Australia and the United Kingdom, evidence suggests that systems are once again becoming increasingly segregated and exclusive (Boyle & Anderson, 2020; Florian, 2019). Undeterred, global organisations such as the United Nations and UNESCO continue to advocate for inclusive education, affirming inclusive education's prominence within the international education agenda (Artiles & Kozleski, 2016).

Advocacy for inclusive practices can be found in the work of another influential global organisation – the OECD. For more than two decades, the OECD has been campaigning for and challenging education systems to think differently about schooling (OECD, 2012). Disrupting traditional education practices through innovative school design that is deliberate and responsive and transpires alongside innovation in curriculum, pedagogy, and assessment affords an opportunity to move beyond the inclusion/exclusion debate. There is an opportunity to create schools which are designed from their very foundations to support the educational needs of all students. This opportunity is made possible because the OECD's view on innovative teaching and learning articulates that inclusion is a pillar of the ILE design. Therefore, the reimagining of spaces affords the prospect to shift how we perceive inclusion in its current form.

The spaces of belonging framework

A sense of belonging is premised on the sociocultural connections that create ties to schooling spaces (Page et al., 2021b). Baroutsis and Mills (2018) have identified three spatial elements that relate to belonging: relational; material; and pedagogical spaces. While Baroutsis and Mills' work aligned with practices in schools, we have used the

framework as a lens in which to view spaces of belonging for students with disability. Therefore, the use of this spatial theory enables us to consider how school belonging is produced in school spaces through the three different spatial elements (Baroutsis & Mills, 2018). As we outline in this section, the three spatial elements form school space: enabling or disabling belonging; engagement; and connectedness within the setting. We explored students' experiences within ILEs to show their views on ownership of space, building belonging and feelings about how they belonged or did not belong in school spaces. The first of the three spaces of belonging are relational spaces.

Relational spaces

Relational spaces support and encourage social/emotional interactions in ILEs (Blackmore et al., 2011) between teaching staff and students with disability and are 'often associated with practices of inclusion and exclusion … and when discussing belonging … not all practices of inclusion are favourable for young people' (Baroutsis & Mills, 2018, p. 2). The educational space, therefore, is considered a 'complex web of relations' (Massey, 2013, p. 265). Students might become disengaged if the importance of recognising relational space is left unaddressed. Likewise, if social interaction is limited, they may feel excluded. Disengagement can occur when students with disability are left feeling not included, accepted or supported (Küçüker et al., 2018). Alternatively, if interactions include others that make them feel like they belong, then the space can be considered supportive and safe (Hooks, 2008). Subsequent teaching practices within relational space promote a commitment to the overall group and to relationships among all members.

Material spaces

Space should be shared by all and spaces specifically designed such as school spaces in ILEs can provide for greater social interaction between staff (Blackmore et al., 2011), thus illustrating the interaction between the material and the relational. Bessant (2018) explains this concept in more detail, articulating the forms in which design practices promote a sense of belonging. Bessant refers to material spaces as mappable physical forms of space, where social formations are produced and re-produced. In terms of the physical space, special education has been traditionally isolated from the mainstream setting where the special education buildings are set to the side, usually on the parameter of the site (Thorius, 2016). In building this way, isolated spaces are created and used to control those within that space (Leigh, 2019). Special education students, while not a homogeneous group, have reported that they require supportive mechanisms in place, such as accessible classrooms and services to cater for their disability requirements (Shah, 2007). Each school, therefore, must incorporate specialist requirements within the ILE design in order to avoid being exclusionary.

Pedagogical spaces

In the traditional special education classroom, there is one teacher deploying pedagogical methods that align with teaching in a single-cell space (Buli-Holmberg & Jeyaprathaban,

2016). These traditional spaces can serve to disconnect teachers and students (Byers et al., 2018). Even when it occurs within mainstream settings, special education can be marginalising, particularly if teachers perceive it to be different to mainstream education (Kauffman et al., 2018).

Innovative Learning Environments can enable pedagogy that encourages co-teaching and planning around a space that allows for different pedagogies to occur for learning. These pedagogies include a shift in the role of the teacher from where the teacher leads the learning to one where the teacher becomes a facilitator of student learning (Campbell, 2020).

There is evidence to illustrate that when students learn in a creative learning environment, it fosters student creativity, learning orientation and network support as well as knowledge sharing (Fan & Cai, 2022). Other pedagogical approaches include the engagement of students in inquiry and project-based learning, which is based around student interest and cooperative learning. The design of ILE can support the different pedagogical spaces required for inquiry and project-based learning, e.g. small group break-out rooms, nooks for peers to share and whole-group teaching spaces. Several authors have identified that inquiry learning provides good learning outcomes for students with disability (Yuwono & Pasani, 2018; Zafirova-Malcheva et al., 2018). This evidence belies special education perceptions held by many special educators who consider an inquiry approach is irrelevant in meeting the needs of special education students (Abels, 2014). It follows that educators' beliefs influence the pedagogies they adopt and the way that they accordingly use spaces in ILEs.

School space

The knowledge that is formed in the intersection of the three spaces creates a fourth space. This space pertains to school culture, which can be 'felt in the general atmosphere of the building' (Corbett, 1999, p. 40) and the atmosphere of the environment – for instance, it may be inclusive and pluralistic, and there may be a strong sense of trust (Veck & Wharton, 2021). Within the school space, we can interrogate the material, relational and pedagogical spaces that support or inhibit belonging for students with disability in ILEs.

The current study uses the Spaces of Belonging Framework to explore the complex experiences of students with disability in the school environment. By closely examining their thoughts and perceptions, we aim to identify factors that either support or hinder their sense of belonging, with the goal of enhancing their inclusion and participation in education.

Method

The study involved participants from 35 primary and secondary mainstream ILE schools in Aotearoa New Zealand and Australia. These schools were identified as ILE schools, as they met the criteria of including ILE pedagogy, student-centred design and had the infrastructure elements of an ILE (Te Kete Ipurangi, 2024). The schools all generated an approach to ILE pedagogy which aligns with unique values in their respective schools. In Aotearoa New Zealand, schools are self-

managing and therefore have a level of autonomy to interpret the national curriculum in a way that is in alignment with their local communities. That said, all schools in the study fostered co-teaching and shared practice associated with ILE pedagogy. They promoted a communitarian approach wherein students collaborated to activate each other's learning in the schooling spaces and foster connection and belonging.

To better understand the perceptions of students' use of ILE spaces, a qualitative approach was adopted for this study. We adopted a qualitative design for the following reasons: the design is flexible and consents to an in-depth exploration of participant perceptions, attitudes and experiences (Corbin & Strauss, 2014). In addition, qualitative approaches generate a wide range of ideas and opinions that the students and teachers hold about the issues, as well as divulge viewpoint differences among groups (Berg, 2009). Furthermore, qualitative methods attempt to fill in gaps that are left unexposed by research that is relatively new (Hashmi et al., 2017). Therefore, in line with the objectives of this study, qualitative interviews were a superlative choice (Hashmi et al., 2017). The research question asked: In what ways, if any, does the ILE space impact a student with a disability's sense of belonging? The researchers led semi-structured interviews and collected observation data with teachers and students with disability within mainstream ILEs. This method afforded an in-depth insight into the investigation, namely, that of the experience of students in these purpose-built facilities in ILEs.

The selection criteria for the teachers were that they currently worked with students receiving support under either the Ongoing Resourcing Scheme in Aotearoa New Zealand (Ministry of Education, 2024), or the Integrated Funding Support Program in New South Wales, Australia (New South Wales Government, 2024). Students were enrolled in a mainstream ILE setting. Students, therefore, required moderate to significant adjustments to access learning and necessitated additional support at school. Teacher participants were invited to an interview via an email that was passed on by the school principal. Principals were also invited to participate. Parents of students in the ILE schools were provided with consent forms and information sheets to inform them of the purpose and process of the study. Students were invited to participate after parental permission was obtained and then provided written consent. Seventeen students took part in the study. Nine students were enrolled in primary schools, and eight enrolled in secondary school. Sixteen teachers who worked with the students with disability also took part in the study. Ten were primary teachers, and six were secondary school teachers. Ethics was obtained from the University of New England, New South Wales, Australia by the Human Research Ethics Committee (approval number: HE18–306). Written informed consent was obtained from each participant.

The interviews were transcribed and coded according to Charmaz (2008), using preliminary coding, focused coding and then theoretical integration. During inductive preliminary coding, patterns and themes that related to belonging were highlighted, with a more focused approach during the second stage of inductive coding, where data within categories were compared. Using deductive reasoning, the final coding stage drew on the spaces of belonging to explore how teachers and students perceived material, relational and pedagogical space in ILEs. To maintain confidentiality, pseudonyms have been used throughout this paper.

Findings

The findings from the study indicated that ILEs were experienced positively by many students with disability and made a marked difference in numerous cases in the sense of belonging that translated to learning for some. Teachers related mixed feelings, however, reporting the organisational difficulties experienced by students with disability. Specifically, teachers identified issues with participation, being included, and the sense that they belonged in the classroom with their peers. This contrasted with teachers' experiences of a greater degree of flexibility and accommodation of the needs of students with disability.

Three distinct themes of belonging for students with disabilities were noted in this study and are outlined here to provide context for further discussion. Firstly, every student interviewed reported a willingness to be part of the mainstream ILE setting. Secondly, some teachers reported that the barriers were greater than the benefits of including students with disability. Thirdly, other teachers dismissed these barriers in support of inclusion, reporting that students flourished from being engaged in learning. Findings are summarised under the headings of each of these three spaces, and quotes are presented to give voice to the themes evoked by participants of the study.

Relational space

Both teachers and students considered relationships between teachers and students to be a significant aspect of belonging in an ILE. Patrick (senior secondary student), for example, reported that the best aspect of the ILE was 'community. It's more than being connected in the classroom.' When asked about peer relationships, he replied, 'Yeah definitely they are better. We also intermingle between age levels. We study together, as I said, it makes for a sense of community.' Further, Roger (primary teacher) stated that he liked the organisation in his school where students came back to a 'home room', as this enabled students, especially students with disability, 'to know that the teacher in room one is my teacher and he knows me and I know him and we have that relationship'.

Both primary and secondary students considered that they had great relationships with their teachers and teaching support staff. They also spoke of the positive aspect of learning by themselves as well as with peers, as Peter (primary school student) articulated: 'You can do it by yourself or with a buddy.' Being involved in the ILE meant that Jamie, (primary school student) was always with his peer group even when he received extra learning support within the classroom with his classmates. This is in contrast to being removed for extra tuition.

Darion, a secondary school student whose circumstances have meant that he has recently required a wheelchair, commented on the respectful relationships he had experienced with his peer group during this period of change and the teacher support that he receives: 'I like them because they all listen to me.' The social nature of learning is very much encouraged. Roger (primary school teacher) reported:

> One of our principles is around the social nature of learning. We believe that our kids should learn how to collaborate, so we manage that through some of the activities we are doing in class. We look at a kid's strengths and areas they need to develop and identify a role in the group so that they can activity and successfully participate. We also make sure the peer group is supportive and have done a lot of work around that.

Material space

Students reported enjoying the space itself, especially the light, and the furniture. Jamie (primary school student), who had shifted from the traditional setting to the new ILE, considered that the new school was better because 'I can choose where I want to be and what I want to sit on.' Jess, a secondary school student, reported:

> I'd rather be like, in a wide-open school of like, sun coming in through the windows rather than a damp kind of enclosed room with the blinds closed and in the dark. There is a lot of natural light coming in here.

Teachers reported the flexibility in the material space that allows for different ways of connecting that suits the needs of individual students:

> The spaces mean that students with disability can go in and out, if they are having an off day. Like he is today. He is doing the activity and he is choosing to do it on his own. He finds working with others hard. But he is engaged and he was doing it, and he was excited about what he was doing. (Roger, primary school teacher)

Flexibility in how students used space was also apparent at the secondary school level. Joan, a classroom teacher, reported:

> If we don't pressure Joel and have a flexible approach where he can choose, then we get results. He chooses to align his program with his culture, and he has connected with that here. Being in this ILE design has definitely impacted his connectedness. Now, he has learned how to adapt to using space to suit his needs, and he can feel comfortable with himself. His family say that now he is happy and safe, and that is all they want. Now, we are going to work on his reading and writing.

Students flourished when they were able to choose their own learning spaces. Roger, a primary teacher, made the comment:

> We had a child who was very challenging when he first came here and then we found he loved being able to take himself away if he needed to, and work, you know, in a quiet space if he wanted. He would do this without being told and he worked really well and it showed us that he found the class to be engaging for him.

Joan, a teacher in a secondary school, spoke about how Jacob arrived at the ILE last year from a traditional setting.

> When he came here, Jacob was always hiding. You couldn't see his face, he wouldn't talk, he wouldn't engage in anything. We looked into it to see about him and it appears to be the change in the system. That old one didn't work for him, and this one does.

Brenda, a primary school teacher, perceived that students with a disability would feel disconnected from school because of their struggle with the sensory overload of the business of an ILE. 'There is too much stimulus, too much noise, too much choice.'

Likewise, a secondary specialist education teacher, Jane, stated that ILEs did not support the notion that students with disability benefit in connecting to their learning if their disability meant that they were less independent, particularly if they 'were passive and needed constant intervention'. Jane went on to say that 'spaces for students with disability are overwhelming because of the huge amounts of stimuli'. In summary, the theme of sensory overload did appear to be a function of the dependence on students for their teacher to regulate the environment on their behalf.

A further theme emerged where staff spoke of student ownership of the space. Bill, for example, reported that:

> Students with disability can choose where to go: the outside sensory space or an inside area. They can take themselves off and work in a quiet space, and the use of that space, them owning it. This is their school, and they can do with it what they want, although this has its challenges as well. We encourage student voice – you know, do you feel you belong? Do you feel like you fit in here? Is this the right class for you? Then, we accommodate those choices where we can. We have lots of conversations.

Pedagogical space

Many primary school students with disability who were interviewed spoke about the help they received with their learning. This help occurred in a seamless way inside the ILE learning space and was welcomed by students such as Alf (primary school student), who reported that he valued the support he received from his specialist reading teacher and that because it happened in the same area that his friends were in, it did 'not feel different'.

Sherol, another student, describes how another student with learning difficulties in her class is educated alongside her and not separated from the class. Sherol's story focused on the learning rather than the learning difficulty.

> The teacher helps him with his reading. He loves bugs so he writes about bugs. The teacher tells us to go and write something so we can choose to write about that or just normal writing. We can choose. He writes about bugs.

Many of the primary school students liked the technological aspect of connecting their interests with their learning, and this was summed up by one primary school student, Philip, who stated that 'in the computer, there is Reading Eggs. So Reading Eggs is an egg guy so it's called Reading Eggs. Reading Eggs has a lot of cool stuff which I like.'

In terms of technology, some secondary school students spoke of the overreliance on technology. 'It can get a bit too much of a focus', reported Patrick. In regard to other academic support, several secondary students reported that they could get extra support more easily in the ILE than when they were in traditional settings. 'I can just kind of ask for help a lot more easily because rather than teaching at the front of the class, teacher just walks around' (Jillian, secondary school student). Additionally, both primary and secondary students commented on the peer group as helpful in their learning.

The secondary school students did report that at times they found the noise levels difficult, especially when a noisy lesson interrupted a quite study time. Although Jillian liked the ILE space and she found it 'safe', she also reported that it was noisy.

> As a student, yeah, it's been pretty good. It's very different from before how it's more open, but also, what is it like being in the class next door to the one who is playing Kahoots and is really noisy and you are trying to do an internal [exam]. But it's a more relaxed and easier environment. I feel safer too.

Patrick stated that he embraced the openness of the ILE and it was better than the single cell because of the spaciousness.

> Even though this noisy space plays up with my ADHD [Attention Deficit Hyperactivity Disorder], it actually is far more better because like, I ask my teacher if I can go for a walk, and they, yeah sure. You don't feel stuck. Its less claustrophobic.

Like Patrick, Ethan, another secondary school student, also echoed the feeling of being comfortable.

> The ILE everything is open and we move around it and get what we need from it. It is also way easier to study. It is like a university campus where you can kind of just like, go and study and you can choose to do that anywhere in the wide-open spaces.

Primary school students also commented on noise. Leah stated that 'the noise really distracts me and I am told to ignore it and sometimes we are told to be quieter for the others.'

Dawn, a secondary teacher commented on the pedagogical affordances that the ILE offered.

> What fits perfectly within an innovative space of course is Universal Design for Learning, so UDL gives equal access to education for every young person in that space. But sometimes student voice is missing, it is our goal but sometimes, especially for students with special needs, adults, we become their voice.

Roger (primary school teacher) spoke of the challenges that such new pedagogical approaches posed:

> The greatest challenge moving from a traditional teaching to collaborative teaching is that teachers could not let go of what they thought was great teaching you know, but there was a lot of things that were not centered around the student but more centered around the teacher.

This perception of a student-centred approach was echoed by Dan (a primary teacher), who shared how Marlon, an 11-year-old with autism, was able to benefit from the flexibility of his programme. '[He] has come along in leaps and bounds in his ability to communicate and express himself and his language is now a real strength.' Another boy in the same year, William, was reported to also being doing well because the pedagogical approach allowed for William to be able to use his interests to learn in other areas. 'He is happy to learn through his special interests and he is calm and he has control over his own learning' (Dan).

Another move that appeared to benefit student success and participation in their learning was that of peer teaching, as Dan stated:

> Kids teaching kids has really been helpful, not only because it provides the child who is doing the teaching with confidence, but the one who is being taught benefits too. They seem to like being shown by their peers if they get stuck.

Jane, a secondary specialist education teacher, pointed out that there are particular social benefits for students being included in mainstream ILEs. She alluded to the social isolation and margination that she observed when they were enrolled in traditional single-cell classrooms. Jane mentioned that her students have the ability to choose the lessons they want to attend. She reported a 'really important difference' in the young man with Down Syndrome that she supported. 'He is now ready for learning and chooses his own subjects because he is interested in them. Today we went to biology because it was about dissection.' Another teacher at the same school, Joan, stated: 'Students with disability aren't ready for learning until they are ready for learning.' She was referring to the context in that teachers need to 'create a safe space for students, and a safe atmosphere and a safe learning program that is engaging and interesting'.

Anna's teacher, Jane, illustrates the importance of creating safety. Jane reported that Anna (a secondary school student) was 'catatonic' when she arrived at what was to be her third secondary school. She was unable to demonstrate that she could read or write, was uncommunicative and isolated herself socially from others. In less than six months, in an individualised programme that encouraged Anna to pursue her interests and encouraged her successes, Anna was able, with support, to stage manage at the school drama performance. Anna has since seen to reason she needs to read and write and has enrolled in a literacy course. She described the power of having choices and being able to make decisions within mainstream contexts.

> They took the pressure off me. I love doing the stuff I am doing. I am also doing aromatherapy. At school, I can choose any subject I want. The teachers also treat me like an adult, making adult decisions but always there to support me. The teachers opened my eyes to the choices I have.

School space: analysis of comparison between spaces

The space that is created at the intersection of relational, material and pedagogical space is the *school space*. In this space, we can see the overlaps between all spaces in ways that contribute to school culture and the atmosphere in the ILE. Teacher–student and student–student relationships with students with disability, in this case, serve to facilitate student belonging and participation and, therefore, positively impact student learning.

Discussion

Until recently, *space* in the educational context has centred on how teachers and students use space in the mainstream setting (Mahat et al., 2018). While more recent work (e.g. Benade, 2019; Page et al., 2021a) has attempted to redress the imbalance in their analysis of space between school settings outside of the mainstream, research remains scarce. There is certainly a more noticeable gap in the literature pertaining to perceived use of space for students with disability.

From the results of this study, we see several trends. Every student we interviewed reported a willingness to be part of the mainstream ILE setting. While an interesting finding, this result does open itself to several arguments or limitations. Firstly, it contradicts Shah's (2007) finding that students with disability had criticised mainstream settings as they did not cater for any specialist disability service equipment or facilities. This was certainly lacking in the ILEs we visited but was not reported on by students and we might speculate that this was the result of not interviewing students with a high level of specialist service need. Secondly, a counter argument may exist – that the ILE design catered for the belonging of students more so than traditional schools.

Another identified theme was that there was a distinct group of teachers who reported that barriers were more significant than the benefits of including students with disability. A contradictory finding was that other teachers dismissed these barriers in support of inclusion, reporting that students flourished from being engaged in learning. It is interesting to note that the differences in perspective from the teachers who supported full participation of students with disabilities and those who did not, appeared to reflect the culture of that school. To elaborate, teachers who were more supportive of full participation were clustered in the same schools. This has an implication for the feelings of belonging for students with disabilities, as teachers play an important role in student connectedness and feeling welcomed in their school (K.-A. Allen et al., 2021).

This study's findings demonstrate the impact of the ILE on student belonging, where students and their teachers have provided examples of feelings of attachment (Ibrahim & El Zaatari, 2019), a sense of community (Barber & Schluterman, 2008), the sense that peers and adults care about the individual (Liu et al., 2020), a feeling of safety (Pikulski et al., 2020) and school engagement (Libbey, 2004). The results support K. Allen et al.'s (2016) notion that belonging is reflective of a sense of affiliation with the school and that a positive student–teacher relationship is significant (K.-A. Allen et al., 2021). These perceptions are revealed in the students' sense of acceptance (favourable reception) and belonging (secure relationships and/or affinity) in the ILE mainstream setting (Rose & Shevlin, 2017).

The criticality of teacher support is highlighted (Sailor, 2016), as is school culture (Piotrowsky, 2016). Our findings also support belonging as it specifically relates to students with disability Alesech and Nayar (2020). These five explicit areas of belonging of positive attitude (a culture accepting of students with disability), a student-centred approach, supportive teachers who work with students with disability, teaching and learning that allow inclusive participation, and an understanding and recognition that every child has the right to participate in all school activities, were all observable.

Limitations

There were several limitations to the study. The limitations include a caution relating to the findings and how these results are interpreted. It is difficult, for example, to determine if the positive student experiences and sense of belonging are attributable to any one specific factor, such as the teaching staff, the leadership within the school, or a shift in the timetable or curriculum. This study, therefore, warrants further investigation to establish which factors are strongly related to the findings presented here. Furthermore, the students did not represent those with complex education needs. This is because for the most part these students are included in special schools in Aotearoa New Zealand and within the schools in

the study, the researchers did not have access to these students, even though they participated in the same curriculum framework as students without disability.

Conclusion

Little has been written about inclusion in ILE and specifically how students with disability navigate these mainstream settings. However, the argument that the design of learning environments which provide access, participation and learning for all learners goes beyond the physical environment is an important one. Innovative learning environments can be characterised by openness and flexibility, and these features were valued by students in the study. As spaces that capture a twenty-first century imaginary for future-focused education practice, it is timely to consider the value and challenges of these spaces for students with disability. The students and their teachers in the study provided examples of experiences where there was a sense of belonging in school. When students have a sense of belonging, there are positive and wide-reaching implications. The findings highlight the use of a framework through which educators, researchers and designers can scope and plan for inclusion in ILE spaces and specifically judge the degree to which ILEs afford belonging.

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