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Special Educators' and Occupational Therapists' Professional Learning Through Transdisciplinary Practice

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ABSTRACT

Initial teacher education is primarily focused on pedagogy and does not normally include therapeutic approaches to support students requiring sensory and/or self-regulation support. In contrast, occupational therapists (OTs) are highly trained in this area. This research examines the professional learning of teachers and OTs when OTs were embedded in three Australian public special education schools, employed to work alongside teachers in their classrooms, rather than being allocated a student caseload. Data were collected over 2.5 years from school principals, teachers, teaching assistants and OTs using surveys, interviews, journaling and artifacts. A transdisciplinary approach saw teachers develop deeper theoretical understanding, which changed their pedagogical practices and perspectives. Teachers developed strategies that allowed them to prevent student dysregulation, and they generalized these strategies to other students and contexts. The findings demonstrate highly effective professional learning for both educators and OTs, which serves as a model to improve teachers' application of sensory and regulation strategies in the classroom, and OTs' understanding of school-based program delivery.

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Introduction

Teachers of students being educated in specialist education settings must not only ensure academic achievement but also possess the knowledge and skills required to manage complex behaviors and support students' physical and social development. These children frequently require input from multiple professional disciplines, and evidence indicates that outcomes improve when these professions, such as education and allied health, work collaboratively (Wintle et al., 2022).

This study explores the professional learning (PL) experiences of educators and occupational therapists (OTs) engaged in a transdisciplinary model. In this model, disciplinary expertise is shared across professionals, thereby expanding access to therapies and support for students (Rausch et al., 2021). Specifically, the research focused on collaboration between educators and OTs in three Australian public specialist school settings, aimed at addressing students' sensory processing and self-regulation needs.

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The approach adopted in this project addressed longstanding barriers that typically inhibit effective collaboration between teachers and OTs in the context of school-based occupational therapy (SBOT). This paper reports the resulting PL outcomes for teachers and the OTs involved in the project.

Literature Review

Teacher Professional Learning

Ongoing PL is vital. For teachers, PL provides the opportunity to continue to refine their craft and engage in knowledge-building cycles essential to their professionalism (Rodman, 2019; Timperley, 2011). Similarly, OTs' ongoing PL is necessary to maintain "*practitioner competence, ensuring client safety and quality outcomes, enhancing or expanding professional practice, and reaching career goals*" (American Occupational Therapy Association, 2017, p. 1).

Supporting teacher PL represents a significant investment by government (Bill & Melinda Gates Foundation, 2014; Layton, 2015), and yet, some teachers experience it more as a compliance obligation than as meaningful professional growth (Bill & Melinda Gates Foundation, 2014, p. 10). Moreover, change models imposed through externally mandated PL often encounter resistance (Rodman, 2019), especially when delivered through whole-school formats that fail to meet individual teachers' need.

Some recent approaches to PL have shifted toward teacher-driven models that better meet immediate pedagogical needs and support timely classroom application (Hill, 2009; Rodman, 2019). Professional learning networks (PLN), for instance, enable teachers connect beyond their school settings around shared goals (Brown & Flood, 2020; Doğan & Adams, 2018). Technology has further expanded these opportunities, removing geographical and logistical barriers (Blanton & Perez, 2011; Poortman & Brown, 2017) and presents opportunities for simulated video analysis as a form of PL (Nagro & Monnin, 2022). These developments foster learning cultures that enhance teacher efficacy. As Rodman (2019) and the European Agency for Special Needs and Inclusive Education (2019, p. 32) suggest, cultivating a learning culture where teachers proactively engage with PL can elevate their motivation and commitment to improvement.

Research has clearly outlined what teachers value in PL. A large-scale study involving 1,300 stakeholders and a follow-up survey of 1,600 teachers identified five key elements of effective PL: it should be relevant (i.e., personalized), interactive (hands-on), delivered by someone who understands the classroom context, sustained over time, and respectful of teachers as professionals (Bill & Melinda Gates Foundation, 2014). Further, it is vital that specialist knowledge is accessible, shared, and disseminated flexibly across school teams (European Agency for Special Needs and Inclusive Education, 2015, p. 38). In New South Wales (NSW), Australia, where we conducted this project, high-impact PL is characterized by responsiveness to student needs, leadership support, collaboration, practical application, coherence over time, and accountability (NSW Government Education [NSW], 2023).

Access to regular PD has been found to relate to job satisfaction of early career special education teachers (Gesel et al., 2021). Avidov-Ungar and Herscu (2020) found that teachers at all career stages (entry-level, advanced and expert) were most engaged by practical, workplace-relevant PL. Entry-level and advanced teachers expressed a preference for interactive and participatory learning, while expert teachers sought autonomy in selecting PL aligned to their needs.

Table 1. Features of effective professional learning.

Feature	Description
Personalized	PL must be sufficiently flexible to be relevant to individual teachers' immediate needs and contexts.
Interactive	PL should include active participation with practical, hands-on learning experiences.
Collaborative	PL is effective when like-minded peers to learn together, including forms of peer mentoring.
Sustained	PL that is conducted over time is more likely to result in deeper learning and application.
In addition, PL must recognize:	
Educator	Educators must be treated as professionals who are recognized for their teaching experience and
Expertise	pedagogical expertise.
Contextual	Course content and delivery must be cognizant of the complexity of the education systems in which
Complexity	teachers operate.

McMillan et al. (2018), in a survey of 151 special education teachers discerned that the teachers preferred PL that was delivered on-site, by content experts, as part of collegial teams, practical and extended over time. In particular, the teachers demand PL that is pertinent to students with disabilities. Special education teachers have also identified that building skills to work collaboratively is necessary to successfully work in the field (Young, 2018). However, opportunities for school-based collaboration as a learning context are limited for teachers in all sectors (de Jong et al., 2022).

In special education settings, the PL needs of teaching assistants are equally critical and targeted training is essential to ensure role competence (Abbott et al., 2011; Borosh et al., 2023; Giangreco et al., 2010).

The success of PL is strongly linked to “learner buy-in” and the extent to which learners find the content credible and authentic. Harper-Hill et al. (2022) identified credibility as linked to evidence-based content, and authenticity as dependent on the relevance and applicability of activities underpinning the PL. These principles offer sound guidance for PL design (de Jong et al., 2022).

Conversely, multiple barriers inhibit the successful transfer of PL into classroom practice. These include insufficient time within teachers' schedules, lack of professional autonomy, inflexible formats, generic content, and one-off “hit and run” sessions that fail to reflect classroom complexity (Bill & Melinda Gates Foundation, 2014).

Table 1 below, summarizes the features of effective PL identified in the literature, capturing the components most likely to support meaningful learning and its translation into improved classroom practice.

Occupational Therapists' Professional Learning

Like educators, OTs must meet regulatory requirements to maintain registration, including insurance, ongoing practice, and criminal checks. However, the responsibility for engaging in PL largely rests with the practitioner (American Occupational Therapy Association, 2022). The American Occupational Therapy Association (AOTA) (2017) defines continuing PL as a “*self-directed, reflective process of lifelong learning aimed at maintaining practitioner competence, ensuring client safety and quality outcomes, enhancing or expanding professional practice and reaching career goals*” (p. 1). This learning may take many forms, including traditional learning experiences such as attending a seminar or workshop, or completing a formal course and providing evidence of reflection on how these experiences have built their knowledge and/or competence. In the Australian context, OTs must

complete 20 hours of PD annually to maintain registration (Occupational Therapy Board of Australia, 2019).

Given the often-isolating nature of allied health roles (Wilding et al., 2012), interactive PL is encouraged. Recommended strategies include peer case discussion and collaborative observation (Occupational Therapy Board of Australia, n.d.). However, Johnson Coffelt and Gabriel (2017) found that most OTs commonly engage in independent learning such as article reading, while collaborative activities like study groups are limited.

In addition, SBOT is considered a specialized area of practice with growing demand, which has led to projected workforce shortages and increasing challenges – especially within inclusive education contexts (Jeremy et al., 2024a). Consequently, SBOTs face distinct difficulties compared to their peers in private practice. For instance, Bonnard et al. (2022) identified several key themes contributing to such challenges, including high caseloads and limited time, service delivery limitations, and school stakeholders' limited understanding of the SBOT role – leading to challenges with communicating with teachers, a sense of isolation and a lack of clear professional identity. This contrasts with private practice where OTs deal with their clients (or parents of child clients) directly with less ambiguity. Peer mentoring is one PL strategy shown to build SBOT confidence and competence (Bucey & Provident, 2018) while Clough (2019) advocated greater integration and collaborative support within school contexts. Nevertheless, support for SBOTs remains limited, both at school and systemic levels (Rivera & Boyle, 2020).

While PL expectations and approaches differ across sectors, there is strong evidence that more integrated, context-based approaches are needed to address complex, interdisciplinary needs of students with disabilities. Transdisciplinary professional learning offers a promising response.

Transdisciplinary Learning

To address challenges associated with siloed PL and SBOT, transdisciplinary frameworks have emerged to promote collaboration across disciplines. When implemented effectively, transdisciplinary approaches “obliterate the distinctions between the professional labels of providers” (Rausch et al., 2021, p. 59) with increased learning opportunities (Flavian, 2024). Wintle et al. (2022) propose a framework for OT-teacher collaboration defined by two intersecting axes: trust versus fear of judgment, and co-equal versus expert-novice relationships. Trust and co-equality serve as enablers, while fear and hierarchy introduce tension. Transformative outcomes occur when the enabling conditions are prioritized.

Transdisciplinary practice differs from inter- or multi-disciplinary models by intentionally dissolving professional boundaries to foster shared responsibility and co-construction of knowledge (Choi & Pak, 2006). In this case, educators and OTs are expected to step beyond disciplinary silos to set shared goals and deliver integrated support (Fitzmaurice & Richmond, 2017), while retaining the integrity of their respective expertise (Easton, 2017; Edwards, 2012). This process requires a deliberate move away from hegemonic assumptions about knowledge production and professional territory (Gibbs, 2017), facilitated through communities of practice (Wilding et al., 2012).

Learning is at the heart of transdisciplinary practice (Nandan & Scott, 2013), epitomized by dynamic and contextualized co-learning that integrates academic and professional domains (Allen et al., 2010; DiGiulio & Defila, 2017; McGregor, 2015, 2017; Meyer et al.,

2017; Mitchell et al., 2015). Lotrecchiano (2010, p. 43), based on his synthesis of diverse theoretical perspectives, identifies a range of features that characterize robust transdisciplinary practice: complex problem-solving, praxis orientation, epistemological interpenetration, methodological pluralism, collaborative deconstruction of assumptions, stakeholder investment, adaptability to shifting realities, critical inquiry into disciplinary boundaries, and reflective practice. These attributes provide a comprehensive lens for evaluating transdisciplinary engagement in school contexts.

Specifically, McGregor (2015) emphasizes transdisciplinary problem-solving as a defining feature of this model, where learning evolves in response to complex real-world conditions. Through co-generative processes, professionals develop more adaptive identities, capable of integrating diverse perspectives and embracing complexity. The success of such models can be evaluated by the degree of knowledge integration, expansion of viewpoints, and the shared conviction underpinning problem interpretation (Godemann, 2008).

While the application of transdisciplinary practice in school environments has been demonstrated in schools between OTs and speech-language pathologists (Conley-Stemple & Skuthan, 2024), insufficient research exists on the implications of transdisciplinary practice between educators and health-professionals with systematic reviews identifying limited examples of transdisciplinary practice generally (Castro-Kemp & Samuels, 2022) and OT-educators partnerships specifically (Fitzmaurice & Richmond, 2017). Similarly, Jeremy et al. (2024b) mixed-methods study in mainstream schools suggest that, despite “moderately high levels of collaboration,” there is a persistent lack of clarity on how and why OTs and teachers should collaborate (cf. Clopper et al., 2024), asserting that ongoing professional development is crucial for effective collaboration between OTs and teachers. This underscores the need to further explore the potential benefits of transdisciplinary professional learning in addressing such professional ambiguities within school contexts. To contribute to this field of research, the present study embedded three OTs in three specialist schools, with a focus not on student-specific therapy, but on fostering transdisciplinary professional learning.

Research Design

Schools are complex systems comprising multiple actors and influencing factors. To explore how educators (including teaching assistants) and SBOTs experience PL, and to capture the intricacy of such experiences, a qualitative research design was adopted. The project was conducted across three specialized schools for students with disabilities, all situated within the same metropolitan region of NSW, Australia. Given this configuration, a case study methodology was employed. The research question addressed in this paper: What evidence of transdisciplinary professional learning emerged when OTs were immersed in three specialised school settings?

Case Study Methodological Approach

Case study methodology is well suited to educational research due to its flexibility and capacity to construct meaningful arguments from individual cases while also offering insight into comparable cases beyond the immediate study (Gerring, 2004). As Stake

(1978) observed, “*in-depth knowledge of an individual example is more helpful than fleeting knowledge about a larger number of examples. We gain a better understanding of the whole by focusing on a key part*” (p. 1). Flyvbjerg (2006) similarly emphasizes the value of context-dependent knowledge derived from case study research, as particularly relevant in research on learning.

Case Study Sites

Each of the three participating schools are classified within the NSW public education system in Australia as a School for Specific Purposes (SSP) and are publicly funded government schools operated by the NSW Department of Education. SSPs are standalone public schools that enroll students requiring more complex educational supports than can currently be provided in mainstream settings. Due to their SSP classification and geographic proximity, all three schools operate under the same state government regulations and public funding frameworks, providing a clearly bounded case for evaluating school-based trans-disciplinary collaboration.

School A enrolled 37 students from Kindergarten to Year 12, catering to students with a formal diagnosis of mild to moderate intellectual disability. School B enrolled 61 students (K–12) with confirmed moderate to severe intellectual disability as the primary diagnosis. School C enrolled 50 students across eight classes (K–10). For this study, only the three primary classes were included. The school serves students with behavioral challenges and/or emotional disturbance. Students typically attend for a 12–18-month intervention period attending four days per week at School C and one day at their mainstream school, to which they return post-intervention.

Research Participants

As summarized in Table 2 below, participants included school principals, OTs, all educators and teaching assistants (known in the study settings as School Learning Support Officers [SLSOs], which are equivalent to teaching assistants or paraprofessionals).

As is typical in school settings, staff changes occurred during the data collection period. Notably, two schools underwent a change of principal. As detailed in Table 3, the majority of participants were female, and two-thirds were aged between 40 and 59 years. Nearly half of the educators and SLSOs had between 1 and 10 years of experience, while around 18% had more than 20 years. Most teachers held a bachelor’s degree, with approximately 12% holding a postgraduate qualification/s.

The project commenced with three OTs. Approximately six months into the project, one OT left the school (for reasons unrelated to the study) and a replacement commenced. Consequently, data were collected from four OTs in total. Three were female. Two OTs were aged between 30–39 and two between 40–49. One OT entered the project with 6–10 years of experience, two had 16–20 years, and one had more than 20 years’ experience.

Table 2. Participants.

Stakeholder	<i>N</i>
Principals	5
Occupational therapists	4
Teachers/SLSOs	67

Table 3. Teacher and SLSO demographics.

Gender	%
Female	77.6
Male	16.4
Not disclosed	6.0
Age	
20–29	14.9
30–39	11.9
40–49	33.1
50–59	32.8
60+	6.15
Not disclosed	1.15
Qualifications	
None (SLSO)	3.2
Cert III (SLSO)	19.4
Diploma	7.35
Bachelor's degree	37.3
Master's degree	11.9
Not disclosed	20.9
Years experience	
1–5	24.2
6–10	24.2
11–15	15.2
16–20	13.6
20+	18.2
Not disclosed	4.6

Background

Prior to the study, School C had engaged an OT to support students with complex behavioral and emotional needs. Building on the initiative, the leadership teams of the three schools jointly identified a shared need for staff PL focused on understanding students' sensory needs and strategies for preventing dysregulation.

While allied health professionals had previously visited the schools to provide individual support at families' request, these interactions had minimal impact on classroom practice. To address this gap, the schools directly employed OTs, not to serve individual students, but to support school-wide PL.

The project formally launched with a joint staff meeting across the three schools, involving leadership teams, the researcher, and the OTs. An OT was embedded in each school for one to two days per week. Rather than being assigned to specific students or classrooms, OTs immersed themselves in day-to-day activities across multiple classrooms and the playground, gradually expanding to whole-school support. Termly meetings were held among the school leadership teams, OTs, a project mentor and the lead researcher to share learnings.

Data Collection Methods

Data collection occurred over a 2.5-year period. Four data collection methods were employed: surveys, interviews/focus groups, journaling and artifact analysis.

Three surveys were distributed to teachers and SLSOs over the course of the project (see Table 4).

The 67 teachers/SLSOs represented 100% of the workforce across the three schools at the project's outset. Surveys included both quantitative and qualitative items. Due to the modest

Table 4. Survey respondents.

Timeframe	Respondents	N
Year 1	Teachers/SLSOs	67
Year 2	Teachers/SLSOs	50
Year 3	Teachers/SLSOs	57

sample size, quantitative data were analyzed using descriptive statistics, while qualitative data were analyzed thematically, as outlined below.

Semi-structured interviews were conducted with teachers, SLSOs, principals, OTs, and a small number of parents/caregivers at various intervals. All interviews were audio-recorded and transcribed verbatim. Teachers, SLSOs, and OTs were also invited to maintain reflective journals throughout the study period to document experiences and learning between interview cycles.

To capture the real-world impact of OT immersion, the study also analyzed naturally occurring artifacts. These included meeting minutes, OT-generated information notes, materials from two professional learning sessions delivered by the OTs, school validation documents submitted to the NSW Department of Education, and data from the NSW Government employee survey.

Data Analysis and Ethics

Qualitative data were analyzed systematically to surface patterns, themes, and interpretive insights. Guided by Miles et al. (2019) three-stage analytic framework, comprising data reduction, data display, and conclusion drawing/verification. The process was designed to ensure transparency, rigor, and conceptual depth.

In the initial data reduction phase, the lead researcher and a research assistant independently coded the interview transcripts, qualitative survey responses and journal entries immediately following each point of data collection. Transcripts, survey responses and journal entries were examined line by line, and preliminary codes were generated inductively to capture salient features of participants’ accounts. This dual-coding process ensured divergent interpretations were surfaced early. Following independent coding, the researchers engaged in iterative rounds of collaborative deliberation to reconcile discrepancies. These discussions resulted in the establishment of a shared coding framework, that continued to evolve after each period of data collection over the 2.5 year period. Broad thematic categories were constructed from these reconciled codes, allowing emergent patterns to be anchored in intersubjective agreement rather than individual interpretation.

The second phase (data display and organization phase) involved refining and visually organizing the thematic categories to make patterns more transparent and facilitate deeper interpretive work. Constant comparative analysis (Kolb, 2012) was used to interrogate similarities, differences, and variations within and across participants accounts. Visualization of themes enabled identification of higher-order patterns and conceptual linkages that were not immediately apparent at the coding stage. This process facilitated interpretive dialogue between the researchers and the data, ensuring that emergent interpretations continued to be grounded in the corpus rather than imposed upon it.

The final analytic phase focused on developing and verifying interpretative conclusions. Researchers engaged in synthesis of the entire dataset, continuing to triangulate interpretations against the raw data to test the adequacy of interpretations. The process culminated in

the themes presented herein that are grounded in the participants' lived realities, while also generating transferable insights of broader significance.

Given the study's bounded case design (focusing on three government schools operating under a shared system framework) cross-case analysis was employed to explore both intra-site distinctiveness and inter-site commonalities (Merriam, 2009; Stake, 2006). This comparative approach enabled the research team to assess the extent, variation, and coherence of transdisciplinary PL across sites, offering both context-specific and transferrable insights.

To enhance the trustworthiness and rigor of the analysis, multiple strategies were employed. These included inter-coder agreement checks (Gwet, 2014), triangulation across diverse data sources (surveys, interviews, reflective journals, and artifacts) (Carter et al., 2014), and continuous analytic reflexivity. Collectively, these strategies contributed to the credibility, dependability, and confirmability of the study (Shenton, 2004).

The study was conducted in accordance with ethical approvals from the University of Technology Sydney Human Research Ethics Committee (ETH17-1587) and the NSW State Education Research Approval Process (2017369).

Findings

Transdisciplinary Learning Context

The PL outcomes described in this study were enabled by the thoughtful structuring of the OT immersion program. Eleven underpinning elements were instrumental in facilitating authentic transdisciplinary practice between teachers, SLSOs, and OTs (Young et al., 2026). These included investment in human resources, a sufficient period for OT immersion, shared language development, flexible timetabling, and a whole-school approach. These foundational components laid the groundwork for the deep and sustained PL outcomes documented below in Table 5. Importantly, the model disrupted traditional student-specific service delivery and enabled systemic, context-driven knowledge exchange.

The findings presented in this paper, that address the research question related to transdisciplinary learning, are organised in two parts: the first focuses on the PL experiences of teachers and SLSOs; the second explores the reciprocal learning experienced by the OTs. Each group's learning is discussed through core themes emerging from data across interviews, surveys, journals and artifacts.

Professional Learning of Teachers

Six primary themes emerged from the data in relation to teacher (and SLSO) PL: deeper theoretical understanding; changing pedagogical practices and perspectives; strategy-building (preventive rather than reactive); generalization of learning; teacher wellbeing; and, transfer to mainstream schools.

Deeper Theoretical Understanding. Teachers consistently reported that the embedded OT model helped them move beyond surface-level implementation of sensory strategies toward a more grounded, theoretical understanding. Many educators had been applying such strategies intuitively but lacked the conceptual framework to articulate or extend their practices. As one teacher noted, in relation to sensory strategies she employed, such as allowing a student to leave the classroom and jump on the trampoline, "*we didn't always*

Table 5. Eleven elements of the ot immersion model leading to transdisciplinary learning.

Elements underpinning model	Description
Investment in Human Resources	Strategic staffing provided opportunities for collaboration both within and outside the classroom. Active support from school leadership significantly enhanced engagement with the OT program.
Sufficient Time	A dedicated immersion period of one school term (9–10 weeks) allowed OTs to understand each school's context, build relationships, and integrate meaningfully.
Modeling	OTs provided in-class modeling of strategies and resources, mentoring teachers in real time. This approach benefited both students and staff, supporting successful uptake.
Developing Trust and Respect	Trust was foundational. Building respectful, long-term relationships between OTs and educators enabled effective collaboration and improved student outcomes.
Whole-School Approach	A consistent, school-wide approach to student regulation, ensuring aligned practices across classrooms and playgrounds.
Shared Language	Immersion of OTs led to the development of a shared language between OTs and educators, improving communication and facilitating translation of strategies into classroom practice.
Flexible Communication	A range of informal and formal communication methods (e.g., observations, discussions, e-mails, and meetings) supported sustained knowledge-sharing beyond co-teaching.
Flexible Timetabling	On-site scheduling avoided disruptions caused by external OT visits and enabled timely, responsive support tailored to classroom needs.
Accountability and Ownership	Embedding OTs within schools increased professional accountability. Strong relationships fostered a collective sense of ownership over student progress.
Developing a Community of Practice	Joint professional development and cross-school collaboration fostered a community of practice. OTs played a pivotal role in catalyzing initiatives and transferring knowledge across schools.

know exactly why we were doing them or why they were working,” (teacher focus group, Y2) and another “*having the language and understanding of what is actually happening to the child or why the child does do what they do and why the strategies we’re using are working has been really great*” (teacher focus group, Y2). Sensory breaks, for example, were now being used with greater purpose and confidence.

This validation of intuitive practice was empowering. One teacher described it as a “*really nice feeling of justification . . . I knew it was working* [sensory strategies they were intuitively implementing], *but it was having somebody say to me this has got a meaning behind it and it’s the right thing to do*” (teacher focus group Y1). Survey data echoed these sentiments: one respondent observed that the OT’s contribution “*reinforced my current practice and gave me a formal structure and deeper therapeutic perspective.*”

In addition to reinforcing what teachers already did, this deepened understanding helped staff articulate and justify their choices in cross-professional conversations, such as when liaising with mainstream colleagues. In doing so, teachers moved from tacit to explicit knowledge, a hallmark of transformative PL. Theoretical fluency became a tool not only for practice refinement but for professional confidence and advocacy.

Changing Pedagogical Practices and Perceptions. Teachers’ pedagogy and attitudes evolved significantly over the course of the project. The quantitative survey data revealed marked improvements in teachers’ confidence and skill application: agreement with the statement “I have improved my practices” increased from 72% in Year 2 to 88% in Year 3. Similarly, agreement with “I understand the impact of each student’s sensory processing strengths/challenges” reached 86% by the end of the study. There was also an increase from 54% to 90% of survey respondents having “considered different ways” of supporting student development as a result of the

embedded OT, while 72% of survey two respondents agreed/strongly agreed that they had “adapted their practice” to support student development. This increased to 88% in the third and final survey.

The teachers and SLSOs continued to build their confidence in applying the strategies, resulting in increased confidence from 73% to 91% toward the end of the data collection period. At the project’s conclusion, 85% of respondents agreed or strongly agreed that they were confident to intervene effectively when a student was dysregulated, up from 68% previously.

Perhaps more revealing, however, was the qualitative shift in how teachers conceptualized student behavior. Previously framed through a behavioral lens, students’ actions were increasingly interpreted in sensory or emotional terms. For example one survey respondent reflecting “*what can we do to support regulation*” rather than “*the student is choosing to be defiant/agitated/aggressive*” (survey respondent Y3) and echoed in a teacher focus group (Y1) “*why kids function the way they do . . . we might think it might be disobedience but it’s actually another factor of anxiety or stress . . . that I didn’t really take into consideration before*” and another in that group spoke of now “*seeing these behaviors aren’t deliberate*” and responding accordingly.

Such re-framing fostered more empathetic, targeted responses, which were grounded in a deeper understanding of student needs. In doing so, the teachers were not just adopting new strategies they were adopting new ways of seeing their students.

Strategy-Building (Preventive, Not Reactive). A core change in practice was the shift from reactive to preventive behavior support. Teachers reported feeling better equipped to notice and respond to early indicators of dysregulation. Survey data presented numerous examples of teachers moving from intervention at the point of escalation, for instance, “*[I now] preempt situations and triggers for them. I am able to make a choice on what activity may assist them to co/self-regulate – which will stimulate and which will calm.*” Another wrote, “*I’m more aware of the signs to look for when the children are getting worked up and I tell the student what zone they are in and direct them to a calming activity*” and another “*frequent monitoring of students’ zones allows me to intervene with preventative sensory strategies at an earlier stage and sometimes prevent red zone behaviours.*”

This anticipatory approach was bolstered by the teachers’ increased understanding of sensory cues. One participant reported a new “*ability to read students’ behaviors and intervene appropriately and prior to the behaviors escalating*” (survey respondent Y3); and another “*reading the “undercurrent” of some students’ emotion and reflection of how they dealt with the challenge*” (teacher journal Y2). One teacher reported being:

More forward-thinking so instead of waiting for that ultimate crisis moment you kind of read the behaviour signs way earlier and try and implement some sort of movement strategy or OT strategy in the system to try and bring the behaviours back the other way so . . . (Teacher interview Y3)

Another teacher learnt that “*those subtle signs that you were seeing because you know you often just look at those things like foot tapping, pencil tapping you know kids that are constantly on the move up and down and what not*” (teacher interview Y2).

A particularly impactful comment came from a teacher who noted in her journal, “*OT is available to talk through therapeutic response to the student, with me, in real time. This provides deep contextual meaning to my PL.*” This quote captures the essence of embedded PL with the chance to immediately trial and reflect on strategies with expert support. Such responsiveness contrasts sharply with traditional, off-site PL formats, which rarely allow for this level of immediacy or personalization.

Generalization of Knowledge. The concept of generalization is considered the apex of learning in special education and was strongly evident in this study with respect to teachers transdisciplinary learning. Teachers not only applied OT strategies to students who were initially targeted but adapted those strategies to suit the specific rhythms and needs of their classrooms. One teacher encapsulated this transfer: “*I can use that [strategy] with another student. I’m going to try that with another student.*” (teacher interview Y2) and “*You go home and go, well I have four kids in my class that fit into this box I can use all of this . . . ’cause we’re time poor - . . . so this crosses over*” (teacher interview Y2).

Teachers described using strategies like “Zones of Regulation” with increasing adaptability. One educator decided to create 50 scenario cards and floor markers for students to physically move to a corresponding emotional zone, helping them connect bodily cues with emotional states. Such creativity demonstrate that teachers did not passively consume OT input, but internalized and customized it in sophisticated ways.

Classroom design also reflected this evolution. A previously underused sensory room was reevaluated: “*I just don’t feel like I need to book time to go into the sensory room when I can achieve the same if not more just in the area off the classroom.*” (teacher interview Y3). This statement highlights not only the transfer of sensory knowledge, but the agency teachers developed in applying it flexibly.

Teacher Wellbeing. Unexpectedly, teachers also reported improved personal wellbeing. They described feeling calmer, more in control, and less emotionally reactive during high-stress incidents. This was attributed to their growing understanding of sensory regulation, not just for students, but for themselves. As one teacher explained:

It’s making me personally a lot calmer . . . I’m able to identify and not be reactive to a situation. I can read a kid’s situation now and then come up with another strategy which helps the kid stay calmer and then it helps me stay a bit more focused and calmer. (Teacher interview, Y2)

Another also articulated this notion:

Marrying up the behaviour plan with the OT strategies and knowing what your pathway is before crisis and adrenaline hits and all that, it’s sort of like that emotional reaction. So before all that comes into play, this process with [OT] and the strategies has really clarified how to deal on a thinking level. (teacher interview, Y3)

This finding is particularly significant in the high-stakes environment of SSPs, where staff are routinely exposed to emotionally charged and physically risky situations. One OT, recognising the toll such incidents take and being:

worried about self-care following a critical incident or a situation where they might have a student who’s being aggressive or abusive or whatever or hits them . . . So I wanted to equip the teachers just with a three-minute activity that they could do in the context of having the rest

of the class. So they're still teaching but they can do some breathing activities just to help settle their own nervous system down. (OT interview Y2)

The intersection of wellbeing and PL suggests a virtuous cycle. Improved confidence in managing classroom behavior led to reduced stress, which in turn reinforced the use of preventive strategies. This connection has important implications for workforce sustainability, morale, and teacher retention in specialist education contexts.

Transfer of Knowledge to Mainstream School Settings. Further emboldening the teachers' application of their learning were new working relationships with local mainstream schools, whose staff may have previously interacted rarely with the research sites, with limited knowledge of their operation. This is highly promising for students and staff in the project schools, neighboring schools and beyond, through school visits, observations, PD and TeachMeets (School B, External Validation Report).

The success of this approach was evidenced by the comments of an executive staff member at School C, who explained:

Over 20 different mainstream school groups came through [School C] to observe teacher practice in situ. Feedback from these visits was extremely positive with mainstream school-teachers reporting that they feel more confident in implementing trauma-informed practice back in their schools after visiting [our] school classrooms.

This outcome is notable given the traditionally siloed nature of special and mainstream school sectors. By modeling inclusive, sensory-aware practices, the SSP teachers not only extended their own learning but also positioned themselves as leaders in practice-based knowledge sharing. These engagements represent a powerful reframing of special education from peripheral to central in the broader educational landscape.

OT Professional Learning

Evidence of OTs' PL as a result of this transdisciplinary model of practice is captured through four themes: developing knowledge of the teacher's role; understanding how schools operate; building knowledge of the education system; and mutual problem-solving.

Developing Knowledge of the Teacher's Role

Embedded within the daily routines of special education settings, OTs reported a significant shift in their understanding of the teaching profession. Many entered the project with assumptions about what teaching entailed, often based on limited school-based interaction or therapy sessions isolated from pedagogical contexts. This perspective was challenged as they observed the complexity, pace, and creativity involved in teaching students with diverse needs. The OT embedded in School A noted:

I feel like this learning, my understanding of teachers and also some of the long-held beliefs that I've had about teachers have been really debunked. One of the beliefs is I am starting to understand your training better. We have completely different training. (OT interview Y2)

One OT candidly reflected:

I don't know how teachers do it, develop lessons every single day ... if I was to do a workshop for five hours, it would take me two months to prepare that content. You guys do it on a daily basis, it blows my mind ... (OT interview Y2).

This appreciation extended to the pedagogical framing of student needs. OTs came to recognize that their strategies, while therapeutically sound, needed to align with educational objectives – with that same OT acknowledging, “we have completely different training, we've got completely different skillsets, and we approach information differently because of that.” This insight prompted them to reassess how they framed and communicated interventions.

The reframing of teachers as skilled professionals with their own theoretical knowledge base and responsibilities marked a key learning milestone for the OTs. Rather than positioning themselves as external experts, OTs began to adopt a stance of mutual expertise, understanding that teachers brought essential contextual knowledge that could inform and improve therapeutic approaches.

Understanding of How Schools Operate

Beyond appreciating the teaching role, OTs developed a more nuanced understanding of school systems, routines, and organizational culture. Schools were described by one OT as “*complicated microorganisms*” (OT focus group Y1) characterized by continual adaptation, tight schedules, and overlapping accountabilities helping them to “*understand why different things are harder to trial at schools*” (teacher interview Y2). The immersion allowed OTs to experience these dynamics first-hand. One commented, “*I feel like I can see from the inside a bit more, rather than just being an outsider looking in*” (OT interview Y2).

This perspective enabled OTs to better tailor their input. For instance, they became aware of “non-negotiable” timeframes, such as report-writing periods, during which new ideas were unlikely to gain traction. OTs also developed an appreciation for how shifting school priorities, often due to staff changes or system directives, impacted implementation. As one teacher noted:

[At school] there's a lot of flexibility and adaptability required, and there's a lot of changes that happen very quickly ... so I think [OT]'s kind of learnt to adapt to that. And I think [OT]'s learnt to adapt to a timeline a little bit too because you might need something that works now but in two weeks' time it's not going to work. (teacher interview Yr 2)

These insights prompted greater empathy and flexibility in the OTs' approach. Instead of delivering static programs, they adapted to the operational rhythm of schools, aligning their contributions with the reality of teachers' workloads, priorities, and existing classroom structures.

Building Knowledge of the Education System

The OTs also gained deeper insight into the structural and policy-based dimensions of education systems. This included understanding compliance demands, curriculum documentation, and departmental regulations that shape daily school practice. Watching teachers balance student needs with mandated learning outcomes, one Assistant Principal (interview Yr 2) identified how the OT now recognized the burden of “*accountability ... curriculum requirements to meet ... and goals that aren't just behavior-driven, they're academic-driven.*”

This systems-level knowledge helped OTs refine the feasibility of their suggestions. For example, in one school, OT aspirations for a purpose-built sensory room were curtailed due to zoning limitations and departmental plans to reclaim the space for classroom use. Rather than persisting with an unfeasible idea, the OT recalibrated strategies to fit existing infrastructure, demonstrating an adaptive mind-set shaped by a clearer understanding of systemic constraints.

Critically, this knowledge also shaped how OTs prepared future recommendations. With greater awareness of school timelines, resource constraints and pedagogical goals, OTs became more strategic in designing and delivering interventions, increasing the likelihood of sustainable uptake by teaching staff.

Mutual Problem-Solving

Perhaps the most compelling evidence of transdisciplinary practice emerged in the mutual problem-solving that characterized teacher–OT interactions. These moments of co-reflection and co-construction fostered rich professional learning for both cohorts. As one teacher explained, *“I’ll be teaching a lesson, and if [OT] is in my room I’ll say, ‘Well hang on, how does that work then?’ . . . we have this discussion about it with the class . . . that’s perfect.”* (individual teacher interview Y2).

These co-teaching moments allowed professionals to interrogate each other’s assumptions and create new, hybrid practices. A particularly illustrative example came from a teacher who when one teacher asked the OT *“this is the content I need to teach, how do I teach to proprioceptive [sic]?”* the OT was unsure. This initiated a collaborative conversation with positive results; the teacher remarked:

Where it comes together, it comes together really well ’cause I come at an angle like this and she comes at an angle like that, and somewhere in the middle we go ‘oh, you know,’ and we have these brainstorming moments. (teacher interview Y3)

Another teacher reported:

[OT] brought the OT knowledge but then we’ve got all the behaviour knowledge . . . so it’s just blending it together and teaching each other, and you know one strategy that we talk about you know may not work and then we go back to the drawing board and discuss other options and plans . . . I feel like we’ve taught each other equally. (Teacher interview Y3)

Such exchanges went beyond consultation and reflected genuine knowledge co-production, representing true transdisciplinary PL.

Teachers also noted the way OTs refined their strategies over time. One observed that the OT moved from suggesting numerous activities to focusing on one or two high-impact options. This change, the OT confirmed, came from realizing that *“if I give one or two [strategies] for a week, that holds more traction than 25.”* (OT interview Y2). The learning here was reciprocal: teachers developed therapeutic insight, while OTs learned to operationalize their expertise in ways that were realistic, respectful of context, and co-owned by educators.

Discussion

This study demonstrates the significant potential of transdisciplinary practice to foster deep and sustained PL for both educators and OTs within specialist school settings. The immersive model adopted here facilitated authentic, reciprocal learning relationships,

characterized by shared inquiry, mutual respect, and context-sensitive knowledge exchange. For teachers and SLSOs, this translated into profound growth in their theoretical understanding, pedagogical strategies, and capacity to support students' regulation needs. For OTs, it involved a critical reorientation of their practice within educational contexts and a more nuanced understanding of the systemic and pedagogical constraints and opportunities inherent in school-based work.

The findings highlight that teachers' learning was not limited to the adoption of discrete strategies but encompassed deeper shifts in professional identity and practice. The validation of teachers' intuitive use of sensory supports, once viewed as incidental, was pivotal in affirming their capacity to engage in theoretically grounded, evidence-informed pedagogy. This alignment between theory and practice empowered teachers to reconceptualize student behavior through a sensory and emotional lens rather than one of defiance or misconduct, thus reframing their response from reactive to preventive. This shift in attribution is critical in special education contexts and aligns with broader calls in the literature for PL that enables practitioners to manage complexity (Harper-Hill et al., 2022; Paramita et al., 2020).

Moreover, the capacity of teachers to generalize and adapt their learning to other students and contexts represents a particularly robust form of PL. The movement from acquiring new strategies to modifying existing classroom routines, physical environments, and peer collaboration practices illustrates what McGregor (2015) refers to as transdisciplinary problem-solving, where professionals, in concert with others, evolve into more adaptive, flexible practitioners. This was further reinforced by the unexpected yet powerful improvement in teacher wellbeing. Informed by an understanding of their own sensory processing needs, teachers gained tools to manage their stress responses, suggesting that PL can, and should, support educators as learners and as people. Given the intensifying focus on teacher attrition and burnout, particularly in complex educational settings, this outcome carries important implications for workforce sustainability (Granziera et al., 2021; Ruble et al., 2024; Stark & Koslouski, 2020).

For OTs, the learning was equally profound. The immersive model enabled them to shift from a narrow student-therapy focus to a systems-informed, pedagogy-aligned approach. Through daily interactions, they came to appreciate the intricate demands on teachers, the structural pressures of curriculum accountability, and the unpredictability of school operations. In recognizing that their recommendations must be feasible within real-world classrooms, OTs refined their contributions, focusing on relevance, timeliness, and alignment with educational priorities. This transition echoes Lotrecchiano's (2010) concept of "collaborative deconstruction" where knowledge is iteratively reshaped through dialogue across disciplines.

The collaborative problem-solving between OTs and teachers was emblematic of authentic transdisciplinary engagement. Rather than defaulting to discipline-based silos, professionals engaged in co-constructive processes that led to the creation of new hybrid knowledge that is responsive to both therapeutic and pedagogical imperatives. The quality of this knowledge integration is evident in the adaptability and sustainability of strategies developed during the project. This speaks directly to Godemann's (2008) criteria for transdisciplinary development, particularly the capacity for shared conviction and integration across epistemological boundaries.

Furthermore, the dissemination of knowledge to mainstream schools through teacher-led mentoring and school visits indicates that transdisciplinary PL can catalyze

system-wide transformation. This is a particularly salient finding given the often-isolated position of special education within broader school systems. By positioning special education schools as hubs of innovation and professional expertise, the project disrupted normative hierarchies in educational knowledge and practice, demonstrating how inclusive pedagogies developed in specialist settings can inform mainstream schooling, thereby disrupting the stereotypes and assumptions that currently exist (Ruppar et al., 2022).

The alignment of this project with the key features of effective PL, as articulated in Table 1, is striking. The model was personalized, situated in practice, collaborative, sustained over time, and responsive to the complex contextual realities of school life. The trust and mutual respect that developed between educators and OTs provided the relational foundation necessary for this PL to flourish. Rather than operating as a top-down initiative or externally mandated compliance exercise, the learning emerged organically from the everyday work of supporting students. It was both content-rich and relationally grounded resulting in a combination widely recognized in the literature as essential to effective teacher PL (de Jong et al., 2022; Rodman, 2019).

This research contributes to the emerging literature on transdisciplinary learning by offering a scalable and contextually grounded model of PL. It demonstrates that meaningful professional growth is not the product of brief interventions or generic workshops, but of sustained, respectful, embedded engagement across disciplinary boundaries. It also affirms that the relational and temporal investments required for such learning are not ancillary, but essential. In the context of inclusive education, where no single profession holds all the answers, this model of practice offers a compelling pathway forward.

Conclusion

This study contributes a compelling model for transdisciplinary PL that addresses a long-standing gap between educational and therapeutic disciplines in special education contexts. By embedding OTs within school teams, the project enabled authentic, reciprocal PL. Teachers gained theoretical insight, refined pedagogical strategies, and developed confidence in implementing sensory-informed approaches to support student regulation. Their ability to generalize and adapt strategies reflected a high level of knowledge transfer, and this finding addresses previously identified limitations around the generalization of prescriptive PD for special education teachers (Brownell & Leko, 2018). Teachers enhanced wellbeing highlights the broader benefits of this model. For OTs, the project facilitated a critical reorientation of their practice, enhancing their understanding of pedagogical contexts, systemic constraints, and the need for feasible, curriculum-aligned interventions.

The strength of this model lies in its sustained, embedded nature, and its foundation in mutual trust, respect, and daily professional collaboration. The findings demonstrate that such conditions are not only conducive to effective PL, but essential for achieving integrated, student-centered approaches in education.

This research provides a roadmap for designing transdisciplinary PL that is relational, context-specific, and impactful. It affirms that supporting students with disability is not the sole responsibility of any one profession, but a shared endeavor that is improved when educators and OTs are supported to learn and work across disciplinary boundaries. Transdisciplinary models such as the one presented here offer a practical, evidence-

informed strategy for bridging disciplinary divides and building the collective capacity of educators and allied health professionals.

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CRedit: **Kirsty Young**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft; **John Buchanan**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Writing – original draft; **Joshua Sealy**: Writing – review & editing.

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