Teacher professional learning in large teaching spaces: An Australian case study

Vaughan Prain
Deakin University, Australia
Tracey Muir
University of Tasmania, Australia
Valerie Lovejoy and Cathleen Farrelly
La Trobe University, Australia
Sherridan Emery
University of Tasmania, Australia
Damon Thomas
University of Queensland, Australia
Craig Deed
La Trobe University, Australia
Russell Tytler
Deakin University, Australia

While researchers broadly agree on what enables and constrains teacher professional learning, reconfigured large teaching spaces potentially create new processes and content for this learning. In this paper we draw on six years of study of teacher adaptation to these settings in 10 schools in regional Australia to identify the nature of, and key influences on, this learning. Our analyses are based on a theoretical framing of relational agency illustrated in two case studies of sustained teacher interventions. We found that teachers' professional learning (TPL) in these contexts entailed learning new roles, developing new practices, and understanding the warrants for these practices. TPL was enabled by (a) extensive improvisation and intensive collaboration; (b) opportunities for teachers to observe teacher practices in other schools, and customise them for their own schools; and (c) extended partnerships between teachers and researchers.

Influences on teacher professional learning

Factors that support and sustain teacher professional learning (TPL) have been researched extensively for decades, with emerging agreement on what enables success. This learning is more likely if teachers: (a) see the need for change; (b) are supported over time to enact what they perceive as achievable goals; and (c) have collective buy-in and process agency (Vangrieken et al., 2017). TPL is therefore deeply connected to teachers' sense of their own professional identity, their "overall conception of who they are as teachers, who they believe they are, and who they want to be as teachers" (Beijaard 2019, p. 1; Korthagen, 2017). Partial successes and failures over the short-term, and teacher resistance to new practices, are often explicable in terms of the absence of these conditions for teacher change.

Despite consensus about conditions for effective TPL, policy makers often assume that teaching improvement can be engineered by external mandate. For Biesta (2016) this "quasi-causal thinking" about education as a technical field where "complexity reduction",

or solutions to address the multiple goals and challenges of enacting an effective curriculum, can be applied from outside is at best misguided. As daily participants in professional experience, teachers are "reflexive intentional agents" engaging with the "multidimensional nature of educational purpose" (p. 207). By implication, educational research "can never be translated into abstract and general principles for effective pedagogy" (p. 207). The engineering model fails to recognise how school contexts and cultures deeply influence teachers' will and skill to undertake and sustain change and renewal. Biesta claimed that educational research should instead study the dynamics and particular cultural contexts of teacher learning, aiming to identify how teachers address "complexity reduction" (p. 194) effectively to support student learning.

In this spirit, we report in this paper on six years of study of teacher professional learning in 10 disadvantaged Australian regional primary and secondary schools (2015-2020) where teachers were expected to adapt to large teaching spaces or reconfigure traditional classroom usage. While there is general agreement that teacher teamwork underpins success in such spaces (Prain et al., 2018, 2021; Rytivaara et al., 2019; Robutti, et al., 2016; Subban & Round, 2022; Swabey et al., 2021; Thomas et al., 2019), how this teamwork is built, understood, and sustained remain ongoing questions around teacher professional learning in these new spaces. In the study described in this paper, emphasising teacher relational agency, we took the view that effective change necessarily entails teacher experimentation, adaptation and improvisation, and is aided by trusted external researcher support (Deed et al, 2020; Whitworth & Chiu, 2015).

Aims of paper

In this paper, as university-based researchers in collaborative partnership with participant teachers, we aimed to address the following questions:

(1) What teacher professional learning occurred from sustained interventions in these settings?
(2) What enabled and constrained this learning?
(3) What are the implications for policy and practice in like settings?

We first review the literature on how TPL is currently conceptualised and enabled to frame our study. We then analyse two case studies of embedded practices in these new settings, informed by a theoretical framing of "relational agency" (Edwards, 2007, p. 1) to address these questions.

Conceptualising teacher professional learning and its enablers

Teacher professional learning (TPL) is often viewed from the outside as a performance problem, requiring expert re-skilling of teachers in domain knowledge and/or new teaching methods to improve student learning. This teacher learning is broadly enacted through three types of processes (Vangrieken et al., 2017). These are: (a) formal programs from government initiatives; (b) teacher-initiated inquiry with a "pre-set agenda" (p. 52) to share ideas, exchange strategies, research and analyse practices; and (c) formative

communities with emergent agendas. Our research with participant teachers in this study varied across contexts but was broadly a mix of (b) and (c) in that we sought to understand and support teacher priorities while acting as both resource and critical friend. The literature on TPL highlights the potential for productive researcher-teacher partnerships (Bartholomew & Sandholtz, 2009; Grushka et al., 2005; Thomas et al., 2019), the importance of shared leadership (Sexton & Downton, 2014), and successful in-house coaching (Kraft et al., 2018; Reiss, 2015). There is general agreement that TPL is likely and sustainable when teachers collaborate in practice-based inquiry to design, enact and evaluate their own teaching and learning goals, and have opportunities to share and refine practices.

Research on teacher professional learning in large teaching spaces

Large teaching spaces have been introduced into schools on the assumption that if teachers work side-by-side in teams they can more readily pool their expertise to address students' diverse learning needs (Kariippanon et al., 2018, 2021; Prain et al., 2014, 2018). However, these settings pose new complexities in how to organise effective teaching and how to optimise student engagement in these new settings. Teachers need to develop strong co-teaching relations either within disciplines or joint curricular planning across disciplines, necessitating unaccustomed negotiation of curriculum content and pedagogy. Other challenges include the potential in these new spaces for student disruption and distraction, with some students feeling displaced and ignored, and some teachers uncomfortable with increased peer scrutiny and the demands and exposure of side-by-side teacher collaboration (Prain et al., 2014).

Researchers have noted that TPL in these settings is facilitated by: (a) productive planning among teachers; (b) spontaneous changes, leading to reflective analyses and actions to address gaps between intentions and outcomes; (c) development of adaptive expertise and reciprocal support to synchronise practices; (d) increased shared responsibility for student learning; (e) increased pedagogical and inter-disciplinary learning; and (f) a stronger sense of a shared, lived team purpose (Kariippanon et al., 2021; Prain, et al., 2013, 2021; Swabey et al., 2021).

Successful adaptation often entails teacher improvisation. As noted by Lampert et al. (2013) and Liljenberg et al. (2018), following Weick (1998), effective improvisors in organisations demonstrate many capabilities. While undertaking detailed planning, they are open to departure from routine, using resources to hand. They deal with the unexpected, pay attention to and build on the performance of colleagues, and are broadly comfortable with process over structure. Past research on adaptive strategies in teacher-teaming in large spaces indicates that teachers experiment extensively in how they organise curricular time and space, review and revise practices to address planned and unforeseen outcomes to meet both traditional and emergent goals (Kariippanon et al., 2018; Prain et al., 2014, 2015).

Teachers in regional low-SES contexts face additional challenges (OECD, 2013; Prain et al., 2014; Sullivan et al., 2018) in terms of students' characteristics. Their students are more

frequently absent from school, leave school earlier, and face poorer employment prospects than their urban counterparts (Lamb et al., 2020). Low SES also impacts negatively on students' health and wellbeing (Inchley et al., 2016). The new larger teaching settings therefore have the potential to exacerbate problems around low SES student engagement with schooling, where students perceive a lack of deep connection with their teachers (Prain et al, 2014). Also, as noted by Vangrieken et al. (2017), there is limited research on teacher professional learning in low SES regional settings. Comprehensive research on remote online support for teacher professional learning has indicated patchy outcomes at best and a lack of clarity around what teachers learnt and applied from these programs (Lantz-Andersson et al., 2018).

Theorising researching TPL

In theorising researching TPL, we draw on both Biesta's (2016) nuanced complexity reduction perspective on research, and Edwards' (2007, 2015) cultural materialist perspective on relational agency. We agree with Biesta that complexity reduction is a reasonable staff goal and strategy to understand and organise schooling routines, but we also acknowledge that teacher agency and multiple inputs make complexity and uncertainty inevitable.

In analysing how learning sites are renewed, Edwards (2007, 2015) proposed the concept of relational agency. Given that cultural practices entail dynamic systems (with varying degrees of flexibility and scope for change), relational agency is understood as how participants in any system engage productively with one another, creating expertise networks to enact shared learning goals. For Edwards, this agency pinpoints what teachers need to do, and learn from, to meet their educational goals. Teachers can share and pool subject expertise, coordinate activities to address student diversity more effectively, and deepen professional expertise. We find this account of agency illuminating because it offers both a deeper rationale for teacher collaboration (beyond current versions of pedagogical efficiency, quality assurance, or convenience) and provides indicators of effective teaching. The reconfigured teaching spaces necessitate a shift from the traditional model of one teacher in a conventional classroom to the need for teachers to plan and teach collaboratively in teams, thus altering the nature and means of teacher professional learning. At the same time, any new form of relational agency operates within a "nested agency" (Prain et al., 2013), where teachers and students are constrained by structural, cultural, and pedagogical assumptions, regulations, and organisational practices, as well as their actual and potential roles and responsibilities in school settings.

Context of study

This paper draws on research undertaken in two Australian Research Council projects (2013-2015, 2017-2020) entailing study of how over 120 participant teachers addressed student learning and wellbeing in 10 low-SES regional schools in two states in Australia. Four schools participated in both projects, with six additional schools in the second project. The multiple sites and contrasting school agendas and cultures provided scope to

study complexities of local context and how teachers in different settings attempted to address curricular and wellbeing challenges.

Research methods

Research methods for the projects entailed cumulative analyses of quantitative and qualitative data, including annual student surveys, curricular case studies, classroom observations, teacher and student interviews, curricular documents, student work samples, and annual workshops with participant teachers (see Prain et al., 2015, Deed et al., 2020 for more detail). Teams of four researchers (based in each of three universities) with diverse expertise in literacy, science, mathematics and student wellbeing, partnered participant teachers in three regional cities during the project to support teacher inquiry and professional experimentation. Research analyses entailed a narrative method (Vangrieken et al., 2017) incorporating a synthetic review and thematic analyses of case studies from the two projects. The research team selected the two case studies for analysis in this paper on the basis that they were: (a) indicative of durable interventions (lasting more than a year); (b) demonstrated variety in how and why interventions were initiated and sustained; (c) showcased the nature of, and influences on, TPL; and (d) highlighted different researcher roles to support TPL over time. The first two research questions were addressed through initial individual researcher thematic analyses of relevant data, and then synthesised through research team analyses of literature-informed key themes. The third question on the implications for policy and practice in like settings was addressed through further research team syntheses of case-study findings. Full ethical approval was obtained for the study from the three universities involved in the study (La Trobe Human Ethics Approval No.: E15-133; Deakin University Ethics Approval No: 2016-157; University of Tasmania Ethics Approval No: H0015448). Pseudonyms are used throughout for the schools, teachers and students to preserve confidentiality.

Case study One

"Acacia Primary School" is a regional, low SES school located in a rural farming town in northern Tasmania. Over the course of the project four teachers and their Year 5/6 classes (approximately 11-12 years of age, with about 30 students in each class) participated in the research (2017-2019). The teachers' professional learning as part of the project centred around personalised learning and team-teaching, using the context of mathematics learning and teaching. Staff members at Acacia Primary School were motivated to participate in the project to address their disappointing national test results and to develop a consistent approach to teaching mathematics. The TPL began through exposure to new practices and teaching approaches in other schools through the project, and then participant teachers worked with a mathematics education researcher to facilitate, customise, implement and evaluate these practices in their school.

Throughout the project the Grade 5/6 teaching team, facilitated by the researcher, implemented a coordinated approach to teaching mathematics that built a shared responsibility for this teaching for all year five and six students, regardless of which class they were in. The intention was to create an expertise network through which shared

learning goals could be enacted (Edwards, 2015). Following a visit to one of the Victorian schools involved in the project for 3 years, the 5/6 team of four teachers identified open spaces as an opportunity to engage all learners in a collective experience of mathematics. The approach appealed to the teachers because they saw it as an opportunity to pool and model subject expertise and practice to colleagues, and establish common teaching approaches that valued mathematical thinking, explanation, and student ownership of learning. Termed 'PAC Maths', due to the space it inhabited (Performance Arts Centre), all Year 5/6 students attended the space twice a week to learn mathematics. Each session was led by a member of the Year 5/6 teaching team, who would present a concept, problem or explore an element of mathematics with the whole cohort. Topics and approaches were mutually agreed upon in staff collaborative planning sessions undertaken prior to delivery. In each session, students were seated on the floor, with individual whiteboards used to record their answers and working out. In addition, students were expected to explain and justify their reasoning to each other in small groups and/or whole group. Following this whole group session lasting approximately 20 minutes, students were split into smaller pre-determined groups, with one teacher taking responsibility for each group. The groups were determined through diagnostic testing, but were fluid in nature, allowing for students to progress between groups and to form different groups for different mathematical topics. Throughout the year between 6-8 pre- and post- formative assessments were conducted to support students' needs, with results informing the topics to be covered in the PAC sessions and the small group experiences.

Adoption of PAC maths was a significant departure from traditional teaching practice where each 5/6 teacher had an allocated class group and taught this subject after collaborative planning. PAC maths changed that approach because each teacher was scheduled to lead whole cohort PAC maths introductory sessions, and teach targeted groups, involving students they would not normally have taught. As the teaching of mathematics moved through different topic cycles, the Grade 5/6 teachers used their allocated weekly planning meetings to reflect on experiences, collaboratively identify focuses for future teaching experiences, and discuss the focus of introductory sessions.

Initially when teachers began implementing this approach, there was some reluctance from less confident teachers about leading the whole group sessions. "Troy", for example, noted in a conversation with the researcher:

> … getting up the front [is] beneficial [for the students] because of the language and the dialogue that comes from that … but yeah, some people don't feel that they have the ability or the capability to stand up there. Even after all this time, and even though you might collaboratively plan for it.

While the researcher modelled some introductory sessions as a strategy to address this reluctance, it was encouraging to see that two of the teachers in particular, Troy and Jane, were willing to lead regular sessions. Both Troy and Jane were pivotal in terms of maintaining enthusiasm for the project, working with teachers to build their capacity, and being advocates of the approach for the wider teaching staff. They were also instrumental in sustaining and facilitating the approach between the researcher's visits. Julie, for example, commented in a collaboratively planning session:

> We've had very little behaviour management issues … the kids have really coped with it. There's been no complaints. When it's PAC maths, they don't go, "Oh…" They say, "Oh, PAC maths is what we're doing" and I think it's been good in the sessions that we do have together that they realise that sometimes we can be so isolated in our rooms, "Oh, we're all learning this." That's quite a powerful thing.

Troy often took the lead in the collaborative planning sessions, which also included discussions about improvements in students' outcomes, which he attributed to the PAC maths approach. For example, in a collaborative planning session where the teachers were discussing the results of in-school post-tests following a focus on mental computation, he noted that "James improved by 24, so he went from 15 to 39. Wow. So that was a really massive gain, and Noah actually went from 16 and a half to 39."

Together with positive encouragement provided by Troy and Jane, salient outcomes such as improvements in student data as indicated by pre and post-tests, provided motivation for the teachers to continue with the approach. One of the other 5/6 teachers, Cathy noted that "the strategies that we've named up and the language that's been associated with them has started to come through". The researcher conducted focus interviews with students and could also report back to teachers about students' attitudes towards PAC maths, illustrated by the following comments:

> It's a lot more exciting and it's really easier to work in an open space. (Ian, Grade 6 student).

> I think maths has changed a lot … because last year we just got given the worksheet and it had to be done by some date, and then we had to do it with no help (Mark, Grade 6 student).

While teacher advocacy of this shared approach and improved student learning enabled TPL, there were also time and organisational constraints that needed to be addressed. Having the PAC maths sessions scheduled in a shared space meant that some weeks the whole cohort sessions could not be held due to timetabling clashes. The administration of pre- and post-tests was also found to be time-consuming and often the interpretation of the data was undertaken by Troy, rather than being a shared responsibility. As previously mentioned, the uptake of teachers to lead the whole group sessions proved challenging, although by the end of the project, all teachers were contributing to this.

In summary, PAC maths provides an example of how a team of Grade 5/6 teachers engaged in TPL through their involvement in a research project, which resulted in modifying their teaching of mathematics. Teachers were initially motivated to change their approach to teaching mathematics to address whole school concerns about students' numeracy performance, and through invitation to participate in the research project. Exposure to alternative practices through site visits to other schools demonstrated how the change could be enacted. Site teachers could explain the rationale and strategies of their practices, how they analysed student test results, and the research team could also provide further information. Ongoing support and guidance provided by the researcher and leading teacher advocates such as Troy enabled teachers to engage in ongoing

implementation which was sustained over time. Relational agency and a sense of collective professional identity was evident when the Grade 5/6 teachers at Acacia Primary School shared and pooled their expertise, collaboratively coordinated activities to address student diversity, and deepened their professional expertise.

The impact and effectiveness of the approach was reflected in the school's 2017 numeracy data which, according to the Principal, showed a significant growth in the students' mathematical understanding. Improved school student data was an important indicator of success, and likely to have influenced the school's commitment of time and resources to the project. That validation, along with other salient outcomes such as low achiever improvement and more positive student attitudes, in turn motivated staff to continue with the approach, with the school looking to extend the PAC model of working into year three and four classrooms to develop a consistent pedagogical approach to the teaching of mathematics throughout Grades 3-6.

Case study Two

"Ironbark Secondary College" is a Years 7-10 school located in a large regional town in Victoria with a low SES profile. Since 2010, a teacher advisor (TA) program, a curriculum designed to support students to belong and succeed in the new large learning spaces, has been conducted that focuses on student emotional literacy, personal strengths, positive coping, problem-solving, stress management, gender and identity and positive gender relationships. This age-based developmental program occupies 20 minutes at the start of each school day, guided by a two-teacher team. The school has grown in this time by more than 50 per cent, from fewer than 500 students in 2010 to almost 800 students in 2021. A larger, more diverse student cohort warranted the coordination of programs and activities that could address student diversity more effectively. Edwards (2015) advocated relational agency as an approach that identifies what teachers need to do and learn from in order to achieve such goals. In this case study, we report on: (1) the structure and roles of the teacher advisor program; (2) enablers, constraints and adaptations to sustain the TA program; and (3) teacher advisors' professional learning about relationships, partnerships and curriculum. In addition to interviews conducted in 2013 (Keeffe, in Prain et al., 2014), and in 2019, two university researchers with expertise in literacy and student wellbeing identified teacher professional learning (TPL) through ongoing discussion with 2 TA coordinators and 8 TAs.

Teacher Advisor (TA) structure and roles

Ironbark SC initiated the program to counteract a potential threat of reduced student engagement and sense of belonging when the school moved from traditional to newly built, larger classrooms. The aim was to build student resilience and trust in teachers through establishing close personal relationships. The TA was and remains an integral part of the college community structure (Figure 1).
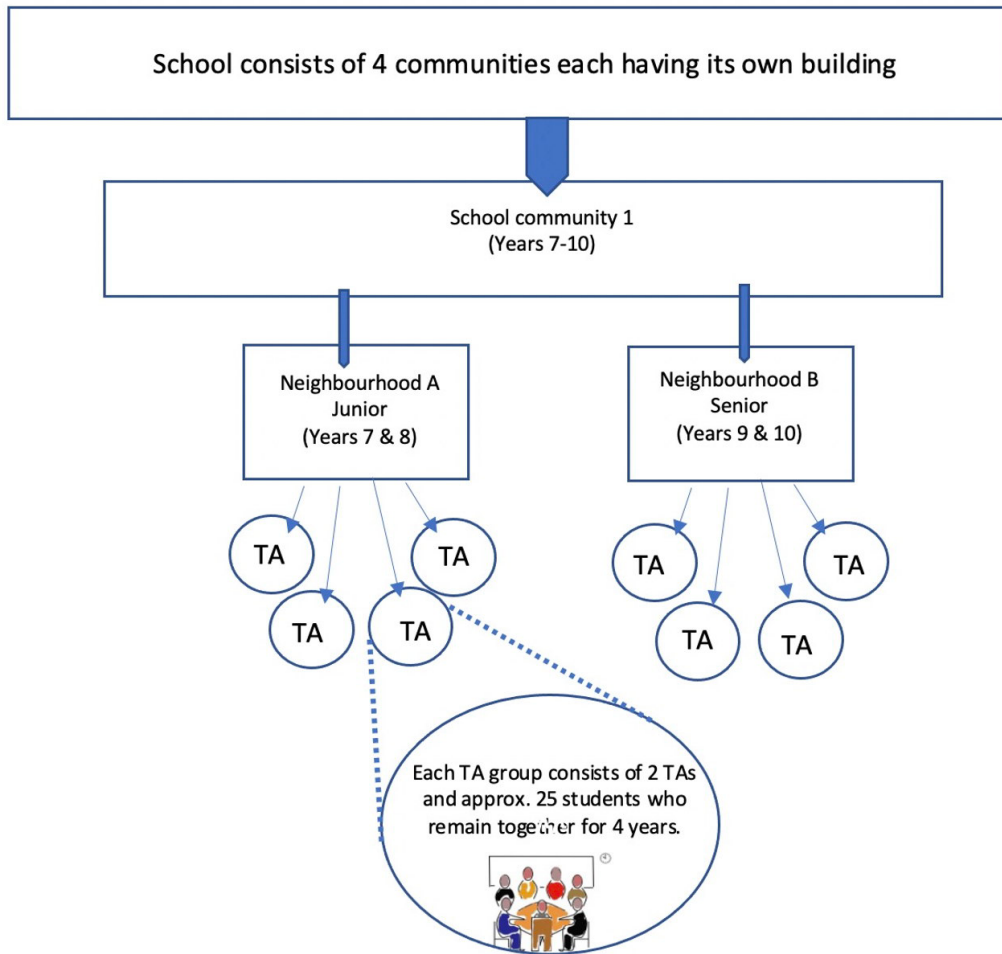
Figure 1: Organisation of school and teacher advisory groups

The TA role is to develop a personal relationship with the students in their group and their families, to act as first contact for parents and students, and as a student advisor and advocate. The school website states that the TA "provides assistance in regard to wellbeing, mentoring and academic support". While the TA is focused on the relationships between teachers and students, the TAs also assist other classroom teachers in behaviour management by providing them with relevant insights into the students' backgrounds and needs. The TA refers students requiring extra support to the wellbeing team comprised of the assistant principal, wellbeing coordinator, nurse and chaplain. While some schools hesitate to allocate such a significant amount of learning time to this type of program (100 minutes a week), Ironbark College believes the benefits for student wellbeing, and positive relationships are worth the time, having been judged to improve student behaviour, promote resilience and improved learning. This judgment is well-supported by research (Addae & Kuhner, 2022; Grové & Laletas, 2020).

Table 1: Enablers, constraints and adaptive strategies in
setting up and sustaining the teacher advisor (TA) program

Enablers	Constraints	Adaptive strategies
School leaders' commitment to program. Recognition that relationship-building underpinned student adaptation to new learning environments and wellbeing at school.	Large communities, open plan learning environment, lack of time for relationship building in class. Rapid expansion of student numbers, competing curriculum priorities.	TA groups of 25 students who remain together for 4 years of 7-10 schooling. Time commitment of 20 minutes each morning with this curriculum to be undertaken 2 days a week.
Recognising the need to foster trust and resilience and a sense of community to build stronger teacher/student relationships.	Perceived lack of expertise. Some teachers lacked knowledge and confidence in supporting student wellbeing. Little ongoing professional development.	Partnership of experienced and beginning teachers, two per TA group, enabled in-situ sharing of knowledge, recognition of strengths, and mutual support. School wide introduction to 4 Rs (Reading, Writing, Respect, Resolution) curriculum in PD program for all TAs.
Establishing relationships with families to build a community around each student.	Time to contact parents beyond curriculum allowance, depending on teachers' goodwill.	TA partners share roles to lessen individual load.
Staff stability in learning communities with 4 years contact with students.	Staff turnover, more part-time staff and "non-teaching" TAs.	One familiar teacher remains with the group, while others may be new or part-time, or non-teaching assistants.
TA communication with classroom teachers to advise on individual circumstances affecting behaviour or progress.	Over-dependence on TA for disciplinary action conflicts with role as mentor.	Clarification of structures and roles. Disciplinary role is responsibility of classroom teacher with TA acting as advisor and broader wellbeing team for referral of difficult issues.
Development of an explicit TA curriculum with teacher buy-in and scope for flexibility in implementation	Lack of feedback avenues and staff prioritising relationships over curriculum. Student unwillingness to commit to TA curriculum and strategies	Staff PD and mentoring in negotiating and adapting developmentally appropriate curriculum activities to assist growth in professional competence and confidence.

Broad influences on the Teacher Advisor program

Many contextual cultural, structural and pedagogical factors contributed to the implementation of the TA program and enabled its refinement and longevity, despite constraints. TPL is indicated by the adaptive strategies implemented by teacher advisors to address constraints (Table 1).

Over 11 years, as Table 1 indicates, the TA program has been refined both by teacher experience and leadership priorities. Given that every teacher at the school is a teacher advisor, we consider that their participation in the TA program framed and enabled their professional learning. This professional learning entailed 3 areas: relationships, curriculum and partnerships. While these learning foci are common to all teacher professional growth, learning in and from the TA program had distinctive characteristics, in that the teachers had to learn how to enact this curriculum and the particular benefits of sustained close contact with their students over years.

TPL: Student and family relationships

While typically middle-class teachers often struggle to develop positive relationship with low SES students (Brandmiller et al., 2020), TAs at the school believed that the respectful relationships they establish with their TA students and their families were the most beneficial aspect of the program, stemming from sustained engagement over four years. Through this extended contact TAs and students developed highly personalised, nuanced relationships that shaped mutual learning experiences. This continuity and mentoring experience was perceived by teachers as enabling mutual understanding and trust to grow, and ensured the program's survival. As experienced TA "Isabelle" expressed it:

> the awesome building of relationships is the most important part of the program. Having the same students for four years, you know them and their families inside out. You are their supporter, the first port of call. You see them grow and help them on their pathways.

TAs generally teach their TA group in at least one of their regular classes. The personal knowledge that students and TAs have of each other improves relationships in class. This erosion of boundaries between staff and students gives teachers insight into students' points of view and strengthens students' sense of being valued (Bradley-Levine, 2018; Prain et al., 2014; Prain et al., 2015). According to "Genevieve", a language teacher, becoming more aware of students' circumstances has made her "less authoritarian" and "more concerned for students' wellbeing", pre-conditions for building relational agency between teachers and students.

TPL: Curriculum

The TA program as a formal curriculum evolved over time. It began as a wellbeing program formulated from materials gathered from organisations such as *Beyond Blue* (2022) and *Berry Street Education Model* (2022). Although the program was intended to be developmental in approach, some teachers found some activities repetitive and requested more variety. Weekly compulsory staff feedback, though designed to refine the program, was resisted by some TAs as 'checking up' and eventually abandoned. Students disliked the emphasis on written sheets and TAs responded with more emphasis on active student participation to complement the well-embedded 'circle time' discussions.

The program evolved in 2018 to include the mandated Victorian Department of Education curriculum *Resilience, Rights and Respectful Relationships* (4 Rs), a suite of age- and

year-related learning materials designed to develop students' social, emotional and positive relationship skills[1] (Department of Education and Training Victoria, 2016). This teacher adaptation is an example of local complexity reduction of the curriculum. While the TA coordinator lays out weekly themes for each year level and ensures resources are available for downloading, the emphasis on active student participation has continued, and feedback is given informally. Such refinements have reduced complexity in the TA program, ensuring that it is a better fit to the needs of staff and students. According to TA coordinator, "Penny", "there is more sharing of activities among TAs. The program is set but if we come up with a good idea we share it. More people are having input. As new teachers come in you get new flavours."

TPL: Partnerships

Another strength of the program is that every teacher is a teacher advisor and that each TA group has two TAs. Working in partnership with another teacher over an extended period allows mutual support, insight and recognition of the strengths that each brings to the relationship as well mutual growth in skills (Edwards, 2015). "Dave", TA coordinator during the first years of the program, reflected that five years ago tasks were "scripted (i.e., attendance, uniform checking), parent contact was one person and curriculum activities done by the other. Now it is far less scripted, TAs work together as a team and figure it out". He believes it is an improvement as it "suits staff skills".

Other teachers confirm that with increased trust in the partnership, task division has developed increased flexibility and informality. Second year teacher "Grace" said "we share and take things off each other's hands. We don't have specific roles but help each other out." According to experienced teacher Penny "my partner TA is good at connecting with 'tech' (trade) students whereas those who are a bit more creative come to me." "Carol", who had the same TA partner for 9 years, perceived herself to be "lucky. We worked really well together and had a good system. We have very different personalities. Kids who didn't gel with me gelled with him."

University researchers have also played a supportive partnership role in the TA program by stimulating reflection through conversations with students, teacher advisors and school leaders about the successes and challenges of the program, and pathways to further improvement (Farrelly & Lovejoy, 2015). In 2014, a teacher-researcher workshop was held at the school in which the school environment and TA program was showcased to university researchers from participant universities as well as a selection of primary and secondary teachers from Victoria and Tasmania. In this way researchers engaged the TAs in ongoing professional conversations, encouraging reflection on their roles, the program and practices, and sharing of ideas.

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[1] The learning materials cover 8 broad topics: emotional literacy, personal strengths, positive coping, problem solving, stress management, help seeking, gender and identity and positive gender relationships.

Ironbark College leaders recognise that the benefits derived for their student cohort make the significant time commitment for the TA program worthwhile. However, the program faces ongoing challenges. New programs can take priority and the more experienced TAs are expected to provide in situ professional development.

Findings

1. What teacher professional learning occurred from sustained interventions in these settings?

Teachers in the two case studies learnt: (a) how to adapt their teaching to take up the affordances and challenges of the new teaching spaces; (b) how to address curricular and student wellbeing complexities arising from these settings; (c) how to team with other teachers to share responsibility for guiding student learning and supporting wellbeing; and (d) the value of the new practices to their professional identities and knowledge. This learning entailed taking on new and intensified roles compared to working in isolation in separate classrooms. In the first case study participant teachers were now expected to be expert joint leaders of a team that could address the diverse mathematical capabilities of 120 students; in the second case study, teachers as TAs were expected to team with a colleague to develop and sustain a strong advocacy role for a group of students over four years. In both case studies, participant teachers learnt how to enact effective distributed leadership within teams, and across teams in the case of the TA program.

2. What enabled and constrained this learning?

Multiple dispositional, pedagogical, structural, cultural and contextual factors enabled, sustained and constrained TPL in these programs. These factors included: (a) the impetus for change created by the new physical settings; (b) teacher willingness to improvise and change how and what they taught, including new synchronised practices; (c) teacher willingness to learn from one another in the process; (d) relational agency between all participants, including teachers, students and researchers; (e) multiple opportunities to observe and discuss other teachers' practices and customise them to their own context; (f) collaborative rather than highly prescriptive researcher input; (g) teacher recognition of success of new practices, such as improved student learning in the two case studies as an incentive to sustain new practices; and (h) the development of mutual trust and respect over time between participants.

Constraints included teacher resistance to and/or anxiety about changing practices and professional exposure to colleagues, organisational challenges around program development, and in the case of the TA program the challenges entailed in rapidly expanding student enrolment and staff turnover.

The new settings both created new complexities but also prompted teachers to devise and refine new curricula and/or teaching methods. Both curricular practices entailed local, workable complexity reduction to address students' needs and capabilities.

3. What are the implications for policy and practice in like settings?

Our case studies reconfirm the need for policy makers on TPL to recognise teachers as relational agents, knowledge generators and co-researchers, where partnerships with external collaborators need to be built on long-term trust and extended engagement. Our case studies indicate that larger teaching spaces do not simply replicate the TPL content and processes of traditional classrooms, but rather intensify new demands and create new possibilities for changed teacher beliefs and practices. Therefore, policy initiatives should focus on encouraging collaborative inquiry into these new forms of TPL and underwrite the significant commitments of time needed for teachers to devise, implement, and fine-tune practices in these new settings. Changes in teachers' practice takes time and it is unlikely that PAC maths, for example, would have been sustained over time without the collaborative infrastructure, resourcing, and ongoing support of the researcher in the first year of implementation.

The willingness by teachers in both case study schools to adopt and trial new practices was facilitated by exposure to other school sites whereby they saw different effective ways to work. School site visits were followed up by opportunities to engage in dialogue with all teachers and schools in the project. The researchers were then able to support the implementation of alternative practices into their respective schools, which led to sustained changes in practice over time. Policy initiatives, therefore, should include resourcing that extends beyond individual schools to recognise the learning and shared expertise that exists in the wider educational community.

Discussion

Our research does not show how to "translate abstract and general principles for effective pedagogy", but indicates practical, local warranted "complexity reduction" (Biesta, 2016, p. 207) in curricular organisation and enactment, and the necessary role and nature of TPL in this process. Complexity reduction in these case studies entails recognising and addressing dispositional, contextual, structural, and pedagogical influences on how teachers understand and seek to enact their sense of professional identity. By focusing on the dynamics of change processes and the impact of deeply embedded school cultures, we have identified some key conditions for sustained TPL in these settings. The new larger teaching spaces were clearly a catalyst in both case studies for prompting and necessitating changes to teacher practices and beliefs, but productive TPL occurred because the teachers were able to enact a collective, agentic professional identity. They were willing and able to develop approaches and structures within which they interacted productively to make creative and principled responses to old and new complexities in schooling.

In this study the old complexities of the effects of concentrations of low SES student cohorts coupled with regional disadvantage were overlaid with the new complexities of achieving collective teacher effectiveness in new potentially more impersonal settings. Multiple influences affected TPL in each case study. While recognising that the broad principles for effective TPL (such as teacher perception of the need for change, buy-in, and extended support) are firmly established, our study indicates that how these

complexities are addressed depends on local teacher agency, with our case studies focusing on a more effective mathematics curriculum and a curriculum to enhance student wellbeing and connectedness to the school. Generative complexity reduction is not straightforward, and the recent impact of Covid-19 on schooling and home schooling has increased the complexities in sustaining teacher teamplay and continuity in these settings, as well as the scope for collaborative external support. Ultimately, generative complexity reduction needs to be grounded in the experiences and judgements of teachers, rather than prescribed unilaterally from outside. In these new contexts that catalyse new forms and methods of TPL, research and policy can contribute to, but not dictate the what and how of this learning.

Past research on what teachers should learn as professionals enacting current warranted practices, and how this learning should happen, repeatedly demonstrates that how the TPL is undertaken deeply affects what is learnt. How the learning is prompted or initiated (and by whom), and how it is structured, sustained, and supported deeply affect what is adopted, cherry-picked, nominally complied with, or resisted by teachers. Our study indicates that TPL in new settings reprises this theme of the central requirement of teacher agency for lasting worthwhile change, but also indicates that what is learnt and how will differ from traditional processes and practices.

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Vaughan Prain (corresponding author) is a Senior Research Officer in the School of Education, Deakin University.
Email: vaughan.prain@deakin.edu.au

Tracey Muir is an Associate Professor in Mathematics Education, University of Tasmania.
ORCID: https://orcid.org/0000-0001-6305-0679
Email: tracey.muir@utas.edu.au

Valerie Lovejoy is a Research Officer, La Trobe University.
ORCID: https://orcid.org/0000-0002-6981-688X
Email: valovejoy@bigpond.com

Cathleen Farrelly is a former lecturer in Health Education, La Trobe University.
ORCID: https://orcid.org/0000-0003-2851-257X
Email: cathleenf5@gmail.com

Sherridan Emery is a Research Fellow, University of Tasmania.
ORCID: https://orcid.org/0000-0003-2949-2793
Email: sherridan.emery@utas.edu.au

Damon Thomas is a Senior Lecturer in Literacy Education, University of Queensland.
ORCID: https://orcid.org/0000-0001-6400-6901
Email: damon.thomas@uq.edu.au

Craig Deed is an Associate Professor in Curriculum Design, La Trobe University.
ORCID: https://orcid.org/0000-0002-5894-5408
Email: c.deed@latrobe.edu.au

Russell Tytler is an Alfred Deakin Professor in Science Education, Deakin University.
ORCID: https://orcid.org/0000-0003-0161-7240
Email: russell.tytler@deakin.edu.au