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Putting teachers’
“spatial competency” on the
professional learning map:
An environmental scan

Acknowledgments

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The University of Melbourne acknowledges the Aboriginal and Torres Strait Islander traditional owners of the unceded land on which we work and learn. We pay respect to the Elders, past and present, and the place of Indigenous knowledge in the academy.

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Executive Summary

Globally, education systems are investing in more adaptable and student-focused school learning environments. This change demands that educators use a range of pedagogical and teaching practices beyond the traditional didactic approaches. This involves enhancing teachers' spatial competency, which is understanding how to effectively utilise the physical learning space to support diverse and ongoing learning needs. Specifically, spatial competency can be defined as the knowledge and skills teachers need to maximise spatially the use of their learning environments (Mahat & Loh, 2024).

The overarching aim of the project is to develop a spatially focused professional learning and development program that meets the needs of contemporary teachers. To do this, one objective of the project team was to map the range of professional learning and development frameworks currently being used worldwide, and critically, the extent to which any of these addressed teachers' spatial competency. The intent is to map publicly available information at a national and policy level. An environmental scan of individual schools or teachers or measuring the impact of such programs within and between educational jurisdictions is beyond the scope of this project.

Ten countries were selected (including three with multiple jurisdictions) for the environmental scan: Australia (New South Wales and Victoria), Canada (British Columbia and Ontario), Estonia, Finland, Japan, New Zealand, Republic of Ireland, Singapore, South Korea, and United Kingdom (England and Scotland). The countries were selected as either examples of successful systems (Brinkerhoff, 2003), or examples of educational systems similar to Australia, or educational systems where spatial innovation has led to parallel innovation in professional learning. The environmental scan involved a desktop search of publicly available information and scholarly research. Eleven teacher education experts and the Australian Institute for Teaching and School Leadership provided feedback on the accuracy and currency of the information found.

The results of the environmental scan are summarised in Table 1. The findings demonstrate significant range and variety in the way professional learning and development is conceptualised, administered, and accessed. Professional learning and development range from those where teachers have considerable autonomy to negotiate and drive their own learning to those where professional learning is delivered according to externally determined priorities. Education systems also differ in that some prioritise a “one-size-fits-all” approach to professional learning and development, whereas others encourage transformative learning based on teacher-led action research supported with coaching and communities of practice. They also differ in the extent to which teacher standards—and the need to attest to them—drive the learning that teachers require.

In terms of spatialised professional learning, the environmental scan highlights considerable gaps in the field. Where countries do possess frameworks detailing underpinning principles and practices of professional learning and development, spatial competency does not feature. Where countries have teacher standards pertaining to areas of skill, knowledge, and competency required by teachers, spatial competency does not feature. And where priority content areas for professional learning and development are evident, spatial competency does not feature. Instead, professional learning and development on spatial competency tends to be led by demand. Where schools have innovative design features, there is evidence of some professional learning dedicated to supporting teachers in successful spatial transitions. There is evidence of professional networks, university-based micro-certification courses, online resources, learning about makerspaces, action research tools, and research projects. However, this is generally on a case-by-case basis, and “just in time”, suggesting knowledge is generally held locally by a small number of people. On the current evidence basis, there are few examples of educational systems, notably New Zealand, which have scaled this up to any extent and with any success.

Finally, the findings demonstrate the limitations of such a scan, as it is notably governed by the quality and quantity of publicly available information on which to draw an area of considerable variation. Furthermore, a scan of this nature generally revealed details at a national and policy level—what is intended to happen—rather than engaging with the experience of teachers, and leaders on the ground, to learn what has happened, and, more importantly, what has worked. The efficacy and success of such programs, particularly at the school and teacher level, is beyond the scope of this project.

There are several useful areas of future inquiry. First, understanding what teachers need is an important one. What spatialised professional learning would be of value to teachers? Second, how is it most usefully made available? Is it online, through packaged resources, curated websites, or webinars, or is it offline, through networks of teachers, visiting experts, or action research? Third, how do we know what is working in this area? Evaluating the extent to which professional learning and development is useful, sustained, and impactful would be beneficial. Finally, in terms of teacher standards, how might teacher spatial competency be most beneficially added or embedded into the current system?

The next step for the project team is to gather Victorian teachers' perspectives of the challenges working in a range of learning spaces and identify effective spatially oriented professional learning and development practices.

This phase involves an online survey to identify the professional learning needs and preferences of teachers. The outcome for this phase is to develop a professional learning and development program on spatial competency that is aligned to the Australian Professional Standards for Teachers. Following this, the subsequent aim is to validate the spatialised professional learning and development program. This phase involves a set of fine-grained case studies of individual schools or school groups across government, Catholic, and independent schools in Victoria to investigate the impact on teacher and student variables. Given that large sums of money being spent on school building and infrastructure, this study contributes significantly to yield positive social and educational outcomes by supporting Australian teachers with the development of their spatial competency to improve the learning and outcomes of all students.



Table 1. Overview of Professional Learning in Different Educational Contexts

Country/State	How and by whom?	Mandated?	Aligned to standards?	Framework?	Spatial competency/literacy?
Australia / New South Wales	Different types via accredited organisations	100 hours per “maintenance cycle” (5 years full-time equivalent)	Yes, Australian Professional Standards for Teachers (APST)	Yes, High Impact Professional Learning	Yes, Learning Environments Australasia
Australia / Victoria	Different types via any organisations	20 hours per year for renewal of teacher registration	Yes, APST	Yes, Professional Learning Framework	Yes, University of Melbourne, Learning Environments Australasia
Canada / British Columbia	Different types via professional organisations, private providers, and informal networks	Six teacher professional development days (Pro-D days) annually	Yes, Professional Standards for BC Educators	Yes, The Professional Development Lens	Yes, Association for Learning Environments
Canada / Ontario	Different types via any organisations	Six Professional Activity Days plus two for ministry initiatives plus two for professional growth annually	No, but aligned to self-developed Annual Learning Plans	Yes, Professional Learning Framework for the Teaching Profession	None
Estonia	Different types via professional organisations, private providers, and informal networks	Compulsory for teachers to engage in professional learning to maintain employment	Yes	None	None
Finland	Different types via professional organisations, private providers, and informal networks	No statutory requirements. Teachers obligated to participate in professional development for one to five days a year	No teacher standards	None	None
Japan	Different types via professional organisations, private providers, and informal networks	Until 2021, 30 hours of professional development per two years. No details of new system	No teacher standards	None	None
New Zealand	Different types via professional organisations, private providers, and informal networks	Yes, but not specified	Yes, linked to Teacher Standards	Yes, Professional Growth Cycle	Yes, Grow Waitaha, Tārai Kura & Learning Environments Australasia
Republic of Ireland	Predominantly accessed through the Professional Development Services for Teachers	None	None	Yes, Cosán (Lifelong Professional Learning)	None
Singapore	Different types via professional organisations, private providers, and informal networks	100 hours of professional development per year	None	Yes, Teacher Growth Model	None
South Korea	Different types via public and approved private providers, PLCs	At least 60 hours of professional development per year	Yes, linked to Evaluation of Teacher Professional Development system	None	None
United Kingdom / England	Different types via professional organisations, private providers, and informal networks	None	None	None	Yes, University College London, Association for Learning Environments Europe, & CoReD
United Kingdom / Scotland	Different types via accredited organisations	Professional learning required as part of Professional update, linked to registration.	Yes, Professional Standards for Scotland’s Teachers	Yes, National Model of Professional Learning	Yes, Scottish Futures Trust

Introduction

Education systems around the world are investing in more flexible and agile learning environments that support a variety of teaching methods and student-centred approaches (Fan & Popkewitz, 2020).

Unlike traditional classroom designs, which are often characterised by their rigid, rectangular layouts with desks and chairs facing the front (Bradbeer et al., 2019; Fisher & Newton, 2014), these modern spaces are more open and interconnected and offer a diverse range of learning settings and pedagogical opportunities. The goal of these adaptable and dynamic environments is to better foster students' 21st-century skills and lifelong learning abilities (Mahat et al., 2018).

Teaching effectively in these learning spaces requires teachers to develop a specialised set of skills, which can be enhanced through targeted professional learning and development (Blackmore & O'Mara, 2022; Charteris & Smardon, 2018). This process of developing what is known as teachers' spatial competency, involves teachers refining their teaching strategies (Charteris & Smith, 2017) to go beyond the traditional "talk and chalk" approaches (Charteris & Smardon, 2019). However, despite substantial investments in school infrastructure, many teachers still lack adequate preparation to effectively operate within these learning environments (Imms & Mahat, 2021; Leighton, 2021; Leighton & Byers, 2020).

To better understand the types of professional learning and development (PLD) that could be used to enhance teachers' spatial competency, the project team sets out to develop a better understanding of the way teachers' PLD is applied internationally, and then to see how it has been applied in the context of spatial competency. The intention is to inform the Australian context and provide information to support the development of a spatialised professional learning program in Australia. This follows a significant period of school infrastructure investment in Australia (Goss, 2016; Holland, 2017) particularly since the Building Education Revolution in 2009. Developing teachers' spatial competency is therefore of deep relevance, lest the pedagogical understandings, aims, and approaches remain out of step with spatial innovation, rendering the investment a wasted opportunity (French et al., 2019).

This report is divided into several subsections. The first subsection provides a description of the method undertaken for the environmental scan and a glossary of key concepts. The second subsection presents the findings for each educational jurisdiction, followed by a third subsection offering a discussion of the findings. The final section provides a conclusion and implications for future inquiry.



The Environmental Scan

The purpose of this environmental scan is two-fold. First, to explore forms of PLD currently being used internationally with a view to understanding how PLD is conceptualised, and the frameworks established to support the process. Second, to identify PLD that has been designed to develop teachers' spatial competency.

The environmental scan responds to a key research question: "What frameworks of teacher professional learning and development currently exist globally?" The subsidiary question to be addressed is "Do any existing models of teacher professional learning and development address the concept of spatial competency?"

Review method

The study used a desktop environmental scan, often used to investigate factors relating to success and future thinking, particularly in the business and health sectors; drawing on documents from well-respected existing sources such as published documents and websites (Graham et al., 2008). The scan reviewed the following:

- publicly available documents, typically available from ministries or departments of education;
- reports from professional bodies such as teachers' unions (often pertaining to teacher standards, appraisal, performance, and representation) and from third party organisations such as the Organisation for Economic Co-operation and Development (OECD);
- literature from academic papers; and
- websites (in English).

All sources are referenced accordingly. The scan was undertaken in March and April 2024. To ensure accuracy and currency, the authors of the report enlisted the expertise of 11 teacher education experts who provided feedback pertaining to their country or province.

Scope of the scan

The scan purposefully focused on a set of international jurisdictions to provide breadth and relevance to the review. Moreover, as the underpinning premise of the scan was to identify successful practice, the scan collected information from ten countries organised into five categories.

Where countries contained multiple states, provinces, or territories, two were selected as representative:

- The underlying intention of the scan was to support development of professional learning in Australia, so two Australian states were included: Victoria and New South Wales.
- Three countries were selected for inclusion based on having broadly similar contexts and education systems to Australia: Canada (British Columbia and Ontario), Republic of Ireland, and United Kingdom (England and Scotland).
- Making comparisons between countries based on relative success in standardised international assessments such as PISA and TIMSS has become a factor in scrutinising how well a country is performing educationally (Brandisauskiene et al., 2020). Three OECD countries performing well in the 2022 PISA assessments have been included: Japan, South Korea, and Estonia (OECD, 2023b).
- Two other countries considered high performing educationally according to PISA were also included: Finland and Singapore.
- One country was included due to undertaking professional learning work in spatial competency because of more than a decade of work in renewing schools, particularly since the Canterbury earthquakes (Ministry of Education, 2011; 2020): New Zealand.

For each country, state, or province, the scan is divided into several areas of focus:

- A brief overview of educational system
- Details of approaches to PLD used, including:
 - How and by whom PLD is provided
 - The extent to which PLD is mandated, and to what extent (i.e. hours and/or days required)
 - The extent to which PLD is related to teacher professional standards, or equivalent professional measures
 - The extent to which PLD used an identifiable framework
 - The extent to which PLD is extended to include innovative learning environments and/or teacher spatial competency. If so, how?

The scan retained a focus on practising or in-service, rather than pre-service, teachers in primary and secondary school contexts. Critically, the review collected information at policy and official levels. Given its focus on policy level, the report does not seek to follow the flow of information to more local levels, nor into individual schools. Hence the review makes no attempt to determine the extent to which policy level translates, and, with what success, at the school, teacher, and ultimately student level. Several limitations exist in undertaking an environmental scan of this nature, and these are described in the findings.

Keywords and search terms

As well as searching on the relevant country, state, or province, the scan used a set of keywords pertaining to PLD to identify relevant documentation and websites:

- teacher professional learning
- teacher professional development
- teacher professional learning/development models/frameworks.

Additional terms related to learning environments and spatial competency were also included:

- innovative learning environments
- innovative learning space
- teacher spatial competency
- teacher spatial literacy.

Glossary

Innovative learning environment

The term “innovative learning environments” (OECD, 2017) is defined as educational settings that integrate forward-thinking design and pedagogical practices to enhance learning experiences. These environments are characterised by their flexibility and adaptability, which support diverse teaching methods and learning activities (Mahat & Imms, 2021). In addition to the physical and pedagogical aspects of the learning environment, OECD (2013) highlights that innovative learning environments encompass various dimensions, including social, cultural, temporal, aesthetic, and virtual elements. Such environments often include elements such as collaborative spaces, technology integration, and adaptable layouts that promote student engagement and active learning (Mahat et al., 2018), as well as learning outcomes to include those such as creativity, collaboration, critical thinking, and communication (OECD, 2017; Paniagua & Istance, 2018).

Teacher professional development

The term “teacher professional development” typically relates to structured, planned activities or programs designed to enhance teachers’ knowledge, skills, and practices, often about a particular topic, instructional strategy, pedagogical approach, or curriculum area. It often involves courses (face-to-face or online), and workshops, facilitated either in-school or by external providers. Professional development may be elective or mandated. Professional development is generally more structured and formal when compared with the broader concept of professional learning (Darling-Hammond et al., 2017; Desimone, 2009; Guskey, 2002).

Teacher professional learning

The term “teacher professional learning” emphasises the ongoing process of acquiring new knowledge, skills, and insights related to learning and teaching. It highlights the continuous nature of learning and growth throughout a teachers’ career. Professional learning encompasses a broad range of experiences including formal training, informal learning opportunities, self-directed study, collaborative inquiry, and reflective practice. Teacher professional learning underscores the idea that learning is not only limited to programmed, structured forms of professional development but also occurs through various means, inside and outside formal contexts (Darling-Hammond et al., 2017; Desimone, 2009; Guskey, 2002). More recently, for scholars such as Jones (2023), the term “teacher professional learning” has become the preferred way of encapsulating training, development, and both informal and formal forms of teacher learning.

Teacher spatial competency

Spatial competency, a concept introduced by Lackney (2008) and Steele (1973) and later expanded by Leighton (2021), underpins a teacher’s ability to adapt and enhance their teaching practices to maximise the benefits of learning environments. Leighton further encapsulated the essence of a spatially competent teacher, describing them as an individual who “deliberately and purposefully utilises the attributes of a classroom and surrounding environment to achieve specific pedagogical goals” (Leighton, 2021, p. 251). Mahat and Loh (2023; 2024) extended this by defining “spatial competency” as the skills and knowledge needed by teachers to use the physical space more effectively to enact a range of pedagogical practices to improve student outcomes.

Findings

This section presents the findings for each educational jurisdiction in alphabetical order. For each country, state, or province, the findings provide a brief overview of the educational system; details of PLD approaches in each educational jurisdiction; and, if applicable, the extent to which PLD is extended to include innovative learning environments and/or teacher spatial competency.

Australia

Education in Australia is a shared responsibility of the Australian (federal) Government and the individual state and territory governments (of which there are six states, three internal territories, and seven external territories), with the bulk of responsibility falling to the states and territories. For example, states and territories are responsible for funding, regulating, and maintaining schools. The Department of Education and Training (DET) at the federal level delivers the Australian Government's priorities and goals through policy development and programs.

Students in Australia attend a mix of government (64.0% of students), private (16.3%), and Catholic (19.7%) schools (Australian Bureau of Statistics, 2023). The Australian Curriculum, detailing learning areas, general capabilities, and cross-curriculum priorities, is a national curriculum setting out what should be taught to students, regardless of where they live. Schools can tailor the curriculum to meet the needs of their students to decide how to meet the learning outcomes. The Australian Curriculum, Assessment and Reporting Authority (ACARA) does not mandate which subjects are to be taught (ACARA, 2024). However, every state and territory in Australia has agreed to meet the Australian Curriculum outcomes. For example, in Victoria teachers follow the Victorian Curriculum F–10 (Victorian Curriculum and Assessment Authority, 2024) and in NSW, the NSW Curriculum (NSW Government, 2024a), which are aligned to the Australian Curriculum.

The Australian Institute for Teaching and School Leadership (AITSL) provides national leadership for the federal, state and territory governments in promoting excellence in the profession of teaching and school leadership with funding provided by the Australian Government (AITSL, 2022). AITSL helps to embed the Australian Professional Standards for Teachers (APST). The APST sets the foundation for all accredited initial teacher education programs and professional learning across the country. The APST are designed to clarify the knowledge, practice, and professional engagement and ethical conduct required of all teachers. The APST are organised into four levels—graduate teacher, proficient teacher, highly accomplished teacher, and lead teacher. These stages are designed to reflect the teacher's career stages and the ongoing development of their expertise.

The domain of professional practice includes *Standard 4: Create and maintain supportive and safe learning environments*. This relates to the broader concept of learning environments to support student participation, managing classroom activities, managing challenging behaviour, maintaining student safety, and using ICT safely, responsibly, and ethically (AITSL, 2022).

In the Dabrowski and Mitchell (2021) review of literature on professional learning modes for AITSL, the authors note that teachers (especially those in early childhood education, casual relief, or rural and remote settings) may find it challenging to select high quality professional learning. Dabrowski and Mitchell (2021) identified a set of modes of professional learning and approach types that supported teachers access to effective professional learning and met the AITSL standards (see Table 2).

Table 2. Modes of Professional Learning and Approach Types

Modes	Approaches
Classroom focused	Coaching Mentoring Observation of practice and feedback
Community focused	Collaboration based on work samples Networks Professional learning communities
Face-to-face	Educational setting-based events External events
Online	Modules and courses Webinars/online forums
Research-focused	Inquiry/action research Professional reading

Source: Dabrowski & Mitchell (2021)

In addition, AITSL (2024a) identify a set of “active ingredients”—behaviours or practices that may result in positive engagement with professional learning goals—for teachers to select from when implementing their professional learning plan:

- active learning and reflection
- allows for feedback opportunities
- allows for modelling opportunities
- collaboration
- content and pedagogy in context
- credible source/evidence based
- embedded into teaching practice
- flexible delivery
- future focused
- inquiry focused
- sustained duration
- targeted alignment to existing goals and structures.

These modes, approaches, and ingredients are activated as part of the High Quality Professional Learning Cycle (see Figure 1, AITSL, 2024b), a structured approach designed to support teachers to navigate their professional learning journey, supporting them to identify needs, select appropriate learning, apply and refine learning, and evaluate their impact. This is further supported with a set of online guides for teachers and leaders, as well as an interactive, online professional learning planning tool, the High Quality Professional Learning Toolkit (AITSL, 2024a), to enable teachers to create their own learning plans and consolidate Stage 2 of the High Quality Professional Learning Cycle. This leverages the modes and approaches identified by Dabrowski and Mitchell (2021), as well as the “active ingredients”. All schools also have strategic plans, and annual implementation plans that should be reflected in teachers’ individual goal setting.

Figure 1. The High Quality Professional Learning Cycle



Source: Adapted from AITSL (2024b)

Australia, New South Wales (NSW)

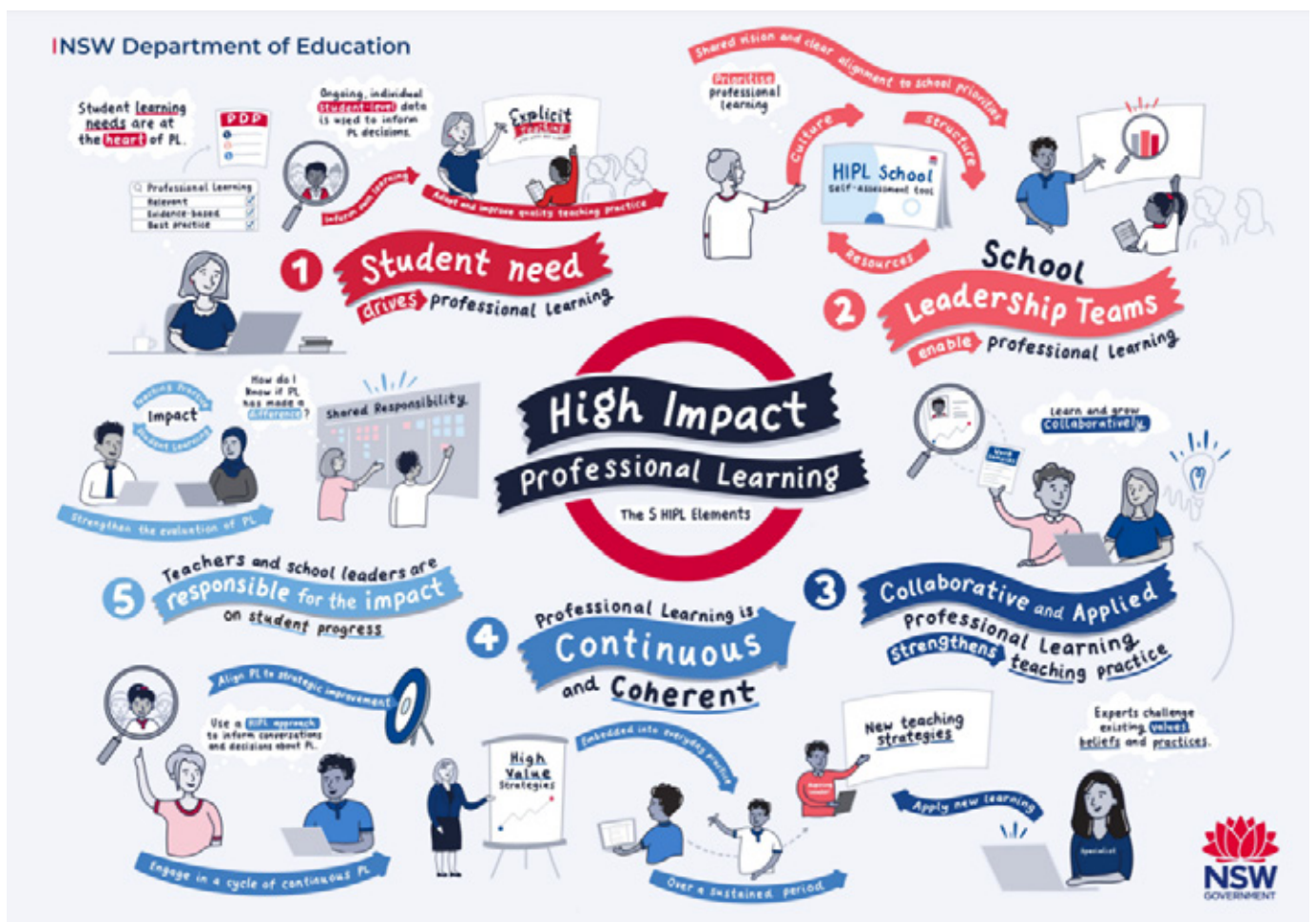
Number of schools	3,125 ¹
Number of teachers	106,857 ²
Number of students	1,249,129 ³

NSW is the largest education system in Australia, committed to providing quality education that prepares students for lifelong learning and rewarding lives. The NSW Department of Education has initiated several reforms in recent years, aimed at system improvement, and the pursuit of equitable outcomes for every learner. Education in the state is overseen by the Department of Education NSW.

Teachers are required to register with the NSW Accreditation Authority (NESA) (2024a), the state-based delegate of AITSL. The NSW Government (2024b) determines high-impact professional learning as made up of five elements:

- driven by student need
- enabled by school leadership teams
- is collaborative and applied
- is continuous and coherent
- impacts student progress and achievement.
- The model is summarised in the infographic as well as the High Impact Professional Learning Model (see figures 2 and 3).

Figure 2. Overview of High Impact Professional Learning (HIPL) Model



Source: NSW Government (2024b)

1 Australian Bureau of Statistics. (2024). *Schools: Data on government and non-government students, staff and schools*. <https://www.abs.gov.au/statistics/people/education/schools/2023#key-statistics>

2 Ibid.

3 Ibid.

Figure 3. Components of the High Impact Professional Learning (HIPL) Model



Source: NSW Government (2024b)

NESA provides registered teachers with an online platform (NESA Learning) to help find accredited professional learning courses; the individual nature of professional learning goals, practices, and reporting is prioritised in NSW. NESA-accredited professional learning is delivered either by NESA or by accredited providers, including Catholic Schools NSW, Association of Independent Schools of NSW, Professional Teachers' Council NSW, and individual non-government schools (NSW Government, 2024c). Teacher professional learning is often available online and on demand (see, for example, Catholic Schools New South Wales, 2024).

In NSW, teachers are required to participate in a minimum of 100 hours of professional development in each "maintenance cycle", referring to the maintenance of teacher registration, which is five years for full-time teachers (NESA, 2023; NSW Government, 2024d). For proficient teachers, this needs to include a minimum 50 hours of NESA-accredited professional development across all mandatory priority areas. For highly accomplished and lead teachers, a minimum of 20 hours of NESA-accredited professional development across all mandatory priority areas is required, along with 20 hours of commitment activities. NESA courses are run by accredited providers.

Currently, teachers are required to complete one NESA-accredited course from four mandatory areas:

- delivery and assessment of the NSW Curriculum/Early Years Learning Framework (EYLF)
- student/child mental health
- students/children with a disability
- Aboriginal education and supporting Aboriginal students/children.

Teachers may also complete PD in the optional areas of leadership to support the learning outcomes of students/children (NESA, 2024b). The balance of a teacher's 100 hours can be any combination of NESA-accredited and/or elective professional development. Elective professional development encourages teachers to select topics of relevance to them. These can be completed in or outside school, provided they meet the APST, and are endorsed by the school's leadership. Relevant academic study may be recorded as elective professional development (NSW Government, 2024e). To maintain accreditation, professional learning must relate to the Australian Professional Standards for Teachers (AITSL, 2022).

Spatialised professional learning and development

There are numerous examples of innovative learning environments in NSW. Examples include Lindfield Learning Village, Alexandria Park Community School, and Claremont College. Although the *Sydney Morning Herald* reported a return to traditional classroom-style teaching and learning spaces (Harris, 2023), the Infrastructure NSW website (NSW Government, 2024f) showcases multiple examples of environments that would be considered “innovative”. Professional learning in the areas of spatial competency was previously handled by the Futures Learning team, and, more recently, the School Learning and Environment Change (SLEC) team at NSW Government (NSW Government, 2024g). The work was terminated in 2023.

The Ructtinger and Stevens (n.d.) literature review on learning spaces for the NSW Government draws on Imms and others (2016), Cleveland and Fisher (2014), and Cleveland and others (2016) to explain that teachers need spatial literacy, or environmental competence, in order to teach well in innovative learning environments, “a competence that has been found to be lacking in many educators” (Ructtinger & Stevens, n.d., p. 4). At the time of this scan, the literature review seemed to be incomplete.

In terms of resources for teachers, the (co-)teacher’s guide to using the Quality Teaching model (NSW Government, 2024h) designed to support teachers in collaborative settings, sets out a relationship between collaborative teaching and Teacher Spatial Competency (TSC). It uses a series of question prompts for teachers to reflect on their practice (see Figure 4).

Figure 4. Reflective Questions from the (Co-)Teacher’s Guide to Using the Quality Teaching Model

Stage	Co-Planning Co-Teaching Co-Debriefing Co-Reflecting			
	Stem	<ul style="list-style-type: none"> • How might...? • How will...? • Which...? 	<ul style="list-style-type: none"> • How is...? • What am I noticing/ observing about... is ... 	<ul style="list-style-type: none"> • What happened...? • Why did it happen...?
Focus question	Teacher spatial competency (TSC)			
	TSC enable us to provide a quality learning environment for our students?			
	TSC enhance pedagogical knowledge to make best use of affordances supporting our ability to guide students to meet (or exceed) lesson intentions?			
	TSC reveal opportunities to use a greater variety of affordances to enhance student engagement?			
	TSC reveal opportunities to use a greater variety of affordances to encourage students to draw on background and cultural knowledge?			
	specific settings and assemblage provide enhanced substantive communication?			
	specific settings and assemblage provide enhanced social support?			
	assemblage encourage and enable student voice and self-regulation?			
wayfinding and cues in the learning environment support student self-direction?				
wayfinding and cues in the learning environment enhance inclusivity and meaningful participation of all students?				

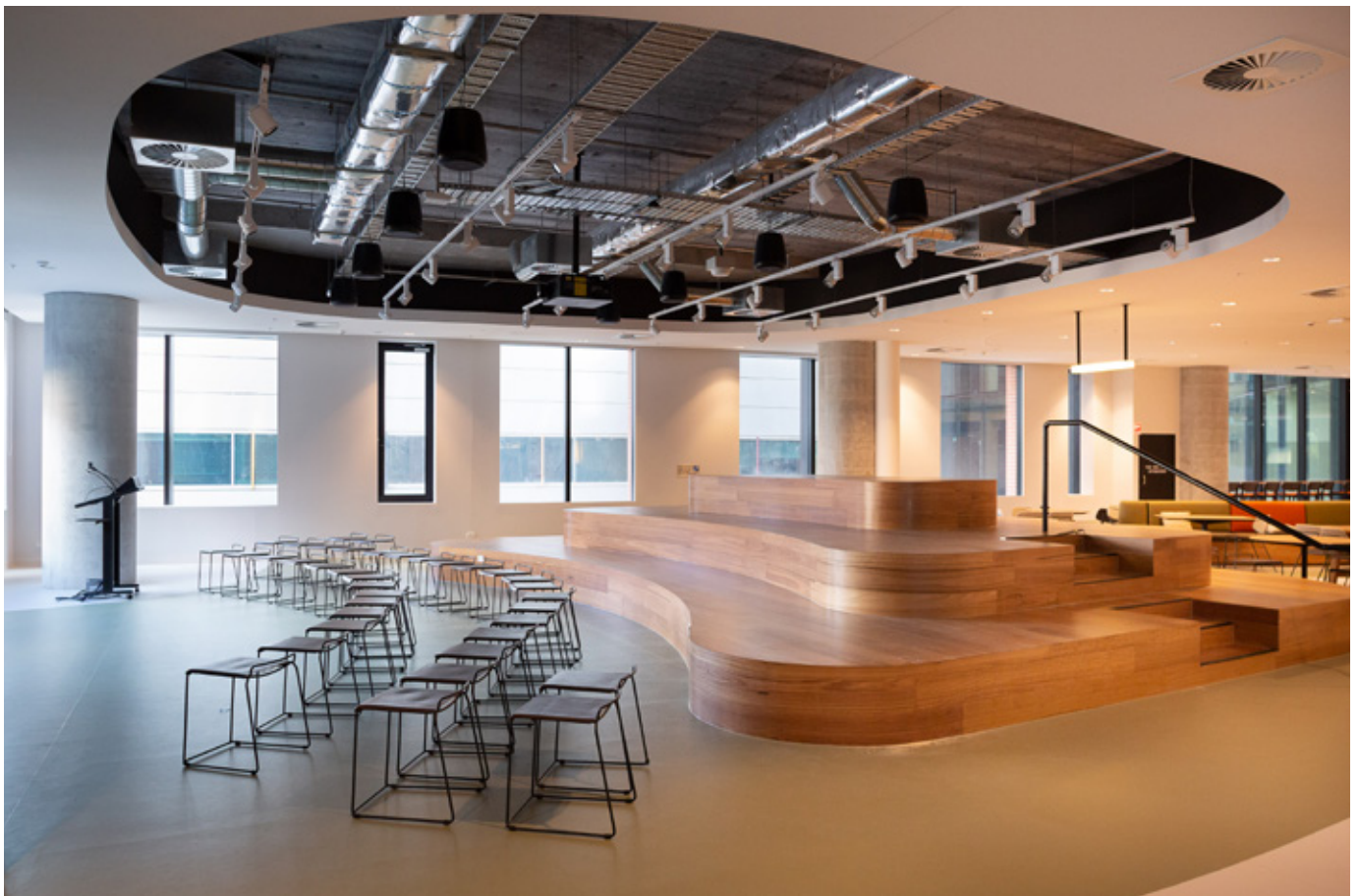
Source: Adapted from NSW Government (2024h).

An additional tool, entitled “Action Plan” (NSW Government, 2024i) appears unfinished at the time of writing but asks teams to consider such questions as “How could you better understand how affordances in the space/s you have are being actualised (used)?”, “How could teachers in your school use a taxonomy of affordances as a tool for exploring the ‘enabling’ and ‘constraining’ elements present in their learning spaces?”, and “How could you support raising teacher awareness of possible actions needed to actualise affordances so that deep learning (or another pedagogical focus) can occur?”

A webpage referring to professional learning entitled *Leading learning and teaching in innovative learning environments* was found but no further details were found (NSW Government, 2024g). The Sophia Program, an initiative of Sydney Catholic Schools in collaboration with the University of Melbourne, provides professional learning and action research for educators in Catholic schools across Sydney, and evaluates longer-term, sustainable quality teaching practices to improve student learning and outcomes (Mahat & Awad, 2023; Learning Environments Applied Research Network (LEaRN), 2023a). The overarching objective is to support principals and teachers in these Catholic schools to use space as a pedagogical tool and support their transition into new innovative learning environments.

The Learning Environments Australasia (LEA) is a not-for-profit organisation with a community of over 950 members within the education design, planning, and building fields. Established in 2000, LEA promotes the creation, design, and development of contemporary and innovative learning environments in Australia, New Zealand, and Southeast Asia (Learning Environments Australasia, 2024). It is a subsidiary of the international organisation, Association for Learning Environments (A4LE).

LEA has seven chapters across the Australasia —Australian Capital Territory, NSW, Queensland, South Australia, Victoria, Western Australia, and New Zealand, plus affiliate groups in Tasmania and the Northern Territory. LEA organises conferences and facilitates the Regional Learning Environments Australasia Design (LEAD) and Chapter Awards Programs that recognise quality design in learning environments, the curation of professional development events (some attracting continuing professional development points), and publication development.



Australia, Victoria

Number of schools	2,283 ⁴
Number of teachers	97,973 ⁵
Number of students	1,035,982 ⁶

Victoria prides itself on being the “Education State”, so named to reflect its commitment towards building a world-class education system, marked by excellence and equity (Victorian Government, 2024a). Education is overseen by the Victorian Department of Education (DET).

Teachers are required to register with the Victorian Institute of Teaching (VIT), an independent statutory body for the profession and delegate for teacher registration of AITSL. VIT is responsible for accrediting initial teacher education, supporting beginning teachers, and developing teacher practice through professional standards (VIT, 2024a). VIT also manages ethical violations.

VIT publishes a Professional Learning Framework detailing the interrelationship between ethical practice, professional knowledge, and professional learning. It illustrates the range of ways teachers may engage in professional learning (Figure 5). Teachers are required to complete 20 hours of professional learning a year to be eligible for renewal of their teacher registration annually. The professional learning needs to align to the APST. This alignment is provided by the teacher and uploaded to a dedicated online platform, creating a record of the teacher’s ongoing professional learning.

Figure 5. Accepted forms of Professional Learning for Teachers in Victoria

Source: Victorian Institute of Teaching (2021).



4 Australian Bureau of Statistics. (2024). *Schools: Data on government and non-government students, staff and schools*. <https://www.abs.gov.au/statistics/people/education/schools/2023#key-statistics>

5 Ibid.

6 Ibid.

For teachers in Victoria, any activities that teachers engage in that help develop professional knowledge and are relevant to their context can count as professional learning. Examples include attending in-school professional development days, workshops, conferences and courses; undertaking further study or professional reading; participating in online learning; engaging in mentoring or coaching; participating in resource development (i.e., with professional associations); and participating in related boards, committees, and panels (VIT, 2024b).

Many organisations—for example, the Department of Education, the Vocational Education and Training (VET) Development Centre (2024) for vocational education and training, and the Victorian Academy of Teaching and Leadership (2024a)—offer professional learning courses and programs for teachers. The Teaching Excellence Program (TEP) offered through the Victorian Academy of Teaching and Leadership is a year-long program for highly skilled teachers to further extend their practice in specific curriculum areas (VATL, 2024b). Independent Schools Victoria (2024) also offer a range of events and program for teachers in the independent sector, covering very similar focus areas.

Under the Victorian Professional Learning Communities (PLCs) initiative, schools can apply for funding to develop their own professional learning communities. Using the Framework for Improving Student Outcomes 2.0 Improvement Cycle, groups of three to six teachers work through short six-to-eight-week cycles focused on improving learning and well-being, based on priorities outlined in their school strategy plan or annual implementation plan. The education department's aim is for all schools to have established PLCs by mid-2024 (Victorian Government, 2024b).

In Victoria, fully registered teachers are required to engage in 20 hours of professional development a year to maintain their teaching registration. Each year, evidence is required against descriptors in each of the three domains of professional knowledge, professional practice, and professional engagement (VIT, 2024b). When selecting professional learning, teachers are encouraged to ask, “How does this activity contribute to my professional knowledge and how will I apply that knowledge to my practice to support the learning of those I teach?” Professional learning activities are recorded online (voluntarily) using the MyPD tool (VIT, 2021).

Spatialised professional learning and development

Multiple schools in Victoria could be described as having innovative learning environments. Many of these resulted from the 2009 \$16.2 billion Building Education Revolution (BER) Program initiated by the Australian Government in response to the global financial crisis and a means to stimulate the local economy (Commonwealth of Australia, 2011; Mulcahy, 2014).

This work has continued under the Victoria School Buildings Authority, with 96 new primary and secondary schools opened since 2017 and 1,940 upgrade projects completed (VSBA, 2024).

Blackmore and O'Mara (2022) state that for schools to benefit fully from the development of innovative learning environments and mobile technologies, teachers should engage in professional learning about relevant pedagogical practices and the use of new affordances. In their case study of 12 schools in Victoria, they note schools and teachers had engaged in whole-school development (particularly around curriculum or pedagogical change), action research (including experimentation and exploration regarding the use of space), inquiry-based learning, co-design to help imagine new spaces, and collaborative work. In each case, there was evidence of strong leadership to support teachers with a change-developing culture and to provide the opportunity for learning to occur in a planned manner.

The University of Melbourne offers a Master's level subject, Innovative Spaces and Pedagogy, as part of its Master of Education (University of Melbourne, 2024) and four online micro-credential courses as part of the Leading Change in Learning Environment series: Learning in Innovative Spaces, Teaching in Innovative Spaces, Teachers' Transition to Innovative Spaces, and Schools' Transition to Innovative Spaces (University of Melbourne, 2024bcde). These are aimed at practising educators in the K-12 sector across Australia who want to extend their teaching practice and improve student learning in innovative learning environments. These micro-credentials are also designed to support others such as architects, educational consultants, and administrators who are seeking the skills to lead change in schools. In 2024, the Learning in Innovative Spaces Melbourne Microcert was endorsed by VIT (2024c).

LEaRN at the University of Melbourne also provides bespoke professional learning programs to schools and school systems such as the Sophia Program (a collaboration with Sydney Catholic Schools—see page 15). Notably Plans to Pedagogy (P2P) involved nine schools across Australia and New Zealand, and provided contextualised support for schools to undertake to design, build, engage, and fully utilise the affordances these spaces provided (Blannin et al., 2020; Morris & Imms, 2024). P2P uses a school-based strategy for assisting teachers to develop the skills and knowledge required to use more effectively innovative learning environments as a pedagogic tool (LEaRN, 2023b). There are several other bespoke programs such as with Trinity Grammar School and Principals Academy in Singapore (see page 33).

Like NSW, Victoria has access to LEA and its regional chapter, which curates several professional development events annually (see page 15 of this report for a description of LEA).

Canada

Canada is divided into ten provinces (Alberta, British Columbia, Manitoba, New Brunswick, Newfoundland and Labrador, Nova Scotia, Ontario, Prince Edward Island, Quebec, and Saskatchewan) and three territories (Nunavut, Northwest Territories, and Yukon).

In each jurisdiction, departments or ministries of education are responsible for the organisation, delivery, and assessment of education for K–12 through policy and legislative frameworks. School boards are entrusted with local governance of education. Most schools are English-first language, although French-language school boards manage federal French-first-language schools, the majority of which are in Quebec. The federal government holds responsibility for First Nations schools on reserves (Campbell et al., 2016).

The teaching profession is unionised, although national frameworks around professionalism, competencies, and the work undertaken by teachers do not exist. Instead, professional standards and certification vary from one province or territory to the next.

In terms of approaches to professional learning and development, provinces and territories have their own approach. By way of example, approaches and frameworks for professional learning are provided here for two provinces: British Columbia and Ontario (employing the greatest number of teachers). Note: information on teacher professional learning and development in British Columbia has, by comparison, been harder to come by. Furthermore, the information available provides considerably less detail than that obtained for Ontario.

Canada, British Columbia

Number of schools	1,950 ⁷
Number of teachers	37,000 ⁸
Number of students	663,225 ⁹

British Columbia aims for its school system to develop the “Educated citizen” where learners “develop their individual potential and to acquire the knowledge, skills, and attitudes needed to contribute to a healthy society and a prosperous and sustainable economy” (Government of British Columbia, 2024a). The government is committed to doing “everything possible” to prepare students for the future, reflecting that, while educational success in the province has always been good, it has not always been consistent or equitable. Differences in achievement have been identified between schools in the province, and in Indigenous and vulnerable learners (Government of British Columbia, 2024a). In 2020, 86.5% of students attended public schools in British Columbia, and 13.1% attended private or independent schools (Statistics Canada, 2021). All teachers in public schools belong to the British Columbia Teachers’ Federation (BCTF) as a condition of their employment. There are 60 elected school boards across the province, who are responsible for personnel, budget setting, and maintenance, but with limited authority over teachers’ work, curriculum, and assessment. There are also 128 First Nations–controlled schools across the province (First Nations Steering Committee & First Nations Schools Association, 2023).

The BCTF’s framework for professional development, The Professional Development Lens (Figure 6), outlines key concepts underpinning professional learning. Three key criteria for selecting professional development are that it be:

- **relevant**—Does this activity help me improve the work I do in my role as a teacher? Does this activity help the teachers involved improve the work they do as a collective?
- **responsible**—Does this activity meet obligations to colleagues, collective, agreements, and our profession?
- **autonomous**—Has this activity been voluntarily chosen? Does this activity jeopardise the autonomy of my colleagues?

7 British Columbia. (2023). *Education by the numbers*. <https://news.gov.bc.ca/factsheets/education-by-the-numbers> (public and independent schools, 2022/2023)

8 Ibid. (FTE staff)

9 Ibid.

In addition, the framework suggests that for teacher-directed professional learning to be successful it needs to be a collective undertaking, diverse, collaborative, funded and supported, and career-long (BCTF, 2023).

Professional learning is available to teachers through professional organisations (for example, BCTF), private providers, and informal networks at school, district, province, and international level. Professional learning opportunities are also provided by individual school districts, often focused on the district goals. These can be offered during school time with teacher release, or after-school sessions. Additional examples include the Teacher Inquiry Program (BCTF, 2024), a professional learning community model where a group of teachers collaborate on an inquiry topic related to current BCTF priorities, facilitated across six half-day sessions.

In the province of British Columbia, school districts schedule six teacher professional development days (Pro-D days) annually. Each year, schools in British Columbia close one day in October (the annual provincial Professional Development Day for teachers) so that teachers can engage in professional learning activities. The focus of the latter is determined by the Ministry of Education (CBC, 2019).

The Professional Standards for BC Educators (BC Teachers' Council, 2019) set out that teachers “engage in professional learning and reflective practice to support their professional growth” (p. 5). The Ministry of Education British Columbia note that professional development for teachers takes two forms: self-guided learning, and via programs offered by the British Columbia Teachers' Federation (Government of British Columbia, 2024b). Teachers are also able to access opportunities for learning from private providers (Brown et al., 2016). *The State of Educators' Professional Learning in British Columbia* report notes that “Educators avail themselves of a wide variety of professional learning opportunities” (Brown et al., 2016, p. 5). Teachers can apply for a salary category upgrade after completing an additional program of study.

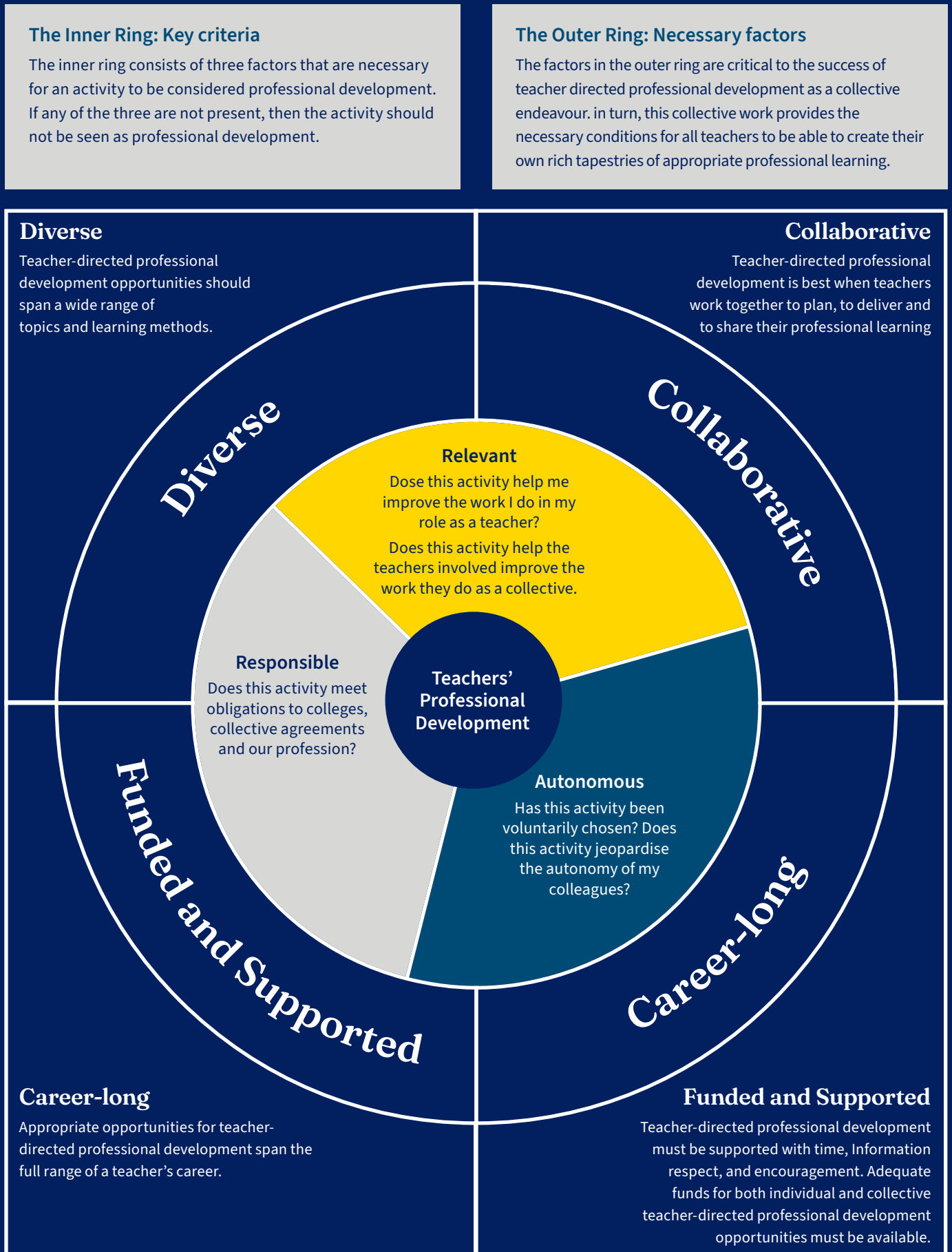
Spatialised professional learning and development

The idea of learning environment is more often associated with conditions for learning and inclusion (see, for example, “Creating a positive learning environment” at Justice Institute British Columbia, 2024) However, there is a Master's level subject focusing on makerspaces at The University of British Columbia (University of British Columbia, 2024).

British Columbia is part of the Association for Learning Environments (A4LE). A4LE is an international interdisciplinary association of professionals working at the intersection of learning and place to drive the evolution of learning environments (Association for Learning Environments, 2024a). The Association for Learning Environments was first established in 1921 as the National Council on Schoolhouse Construction (NCSC) then becoming Council of Education Facility Planners International (CEFPI) in 1971 (Association for Learning Environments, 2024b). It provides an accredited program, Accredited Learning Environment Planner (ALEP), as well as a range of conference, symposia, and events that contribute to the professional learning of teachers and other professionals.

Figure 6. The Professional Development Lens

At the centre of the lens are teachers and their learning, both as a collective and as individuals. The term “teachers’ professional development is used to highlight its use both in thinking about individual PD and PD as a collective endeavour.



Source: Adapted from British Columbia Teachers’ Federation (2023)

Canada, Ontario

Number of schools	4,835 ¹⁰
Number of teachers	126,930 ¹¹
Number of students	2,179,551 ¹²

Ontario classifies its public education system as among the best in the world, offering students a well-rounded education “that prepares them with real-life and job skills needed to succeed in a globalised world” (Government of Ontario, 2024). In 2023, the Ministry of Education took actions to refocus the education system on foundational back-to-basics in reading, writing maths, and STEM education (Government of Ontario, 2024). Ninety-five percent of students attend publicly funded government schools, comprising English public, English Catholic, French public, and French Catholic schools.

The Ontario College of Teachers is the regulatory body that licences, governs, and regulates the province’s teaching profession (Ontario College of Teachers, 2024). The Professional Learning Framework (Figure 7) for the Teaching Profession (Ontario College of Teachers, 2016) presents a variety of ways College members may pursue opportunities for ongoing professional learning, and aims to highlight the interrelationship between ethical practice, professional knowledge, skills, values, and ongoing professional learning. Inherent within this is the idea that autonomy in self-directed professional learning lies at the heart of teacher professionalism.

The conceptual framework for ongoing professional learning also provides a comprehensive view of the multiple ways teachers access professional learning opportunities such as in Curriculum Design, Development and Assessment, Education Courses, Leadership, Research and Scholarship, Collaborative Practice and Community and Social Justice Experiences (Ontario College of Teachers (2016, pp. 8–9). Teachers are also able to access Ministry of Education resources, including webinars, resources, and podcasts on the Ministry’s virtual learning network, D2L (2024).

Additionally, the framework refers to Additional Qualifications (AQ). AQ, accredited by the College of Teachers and offered by approved providers, are programs of study designed to engage in reflection, critical inquiry research, and curriculum and pedagogical leadership. They also enable teachers to teach at additional curriculum levels. Successful completion of an AQ course is recorded on a teachers’ Certificate of Qualification and Registration (Ontario College of Teachers, 2016).

AQ courses are required to have 100 hours of course work plus an additional 25 hours of non-monitored instruction. Depending on the course, this may be online, blended, or face-to-face. Examples include AQ Visual Arts, Teaching English Language Learners, French as a Second language, and Integration of Information and Computer Technology in Instruction.

Teachers in Ontario have access to a wide variety of Ministry, school district, school, and/or self-directed professional learning. This includes, but is not limited to in-school activities, participation in learning networks, mentoring and coaching, and collaborative professional research (Campbell et al., 2016). The framework (see below) presents additional opportunities for teachers to access professional learning.

Under the *Education Act*, the Ministry of Education requires schools to undertake six Professional Activity Days annually, with two additional days dedicated to supporting Ministry of Education initiatives (Elementary Teachers’ Federation of Ontario, 2024). The Ministry of Education’s educational priorities determine the focus of the mandatory days, and are subject to changes in priorities, political context, and policy (Campbell, 2023). In the 2023/24 school year, for example, three of the designated days were mandated to focus on the priority areas of literacy and mathematics; curriculum implementation; and student well-being, school safety, and violence prevention (Government of Ontario, 2023).

Spatialised professional learning and development

No specific courses were found pertaining to innovative learning environments or spatial competency for teachers. In the AQ course lists, the term “learning environment” was applied broadly to classroom management, examining how different components of teaching are integral to creating and maintaining a positive, ethical, equitable, accepting, inclusive, engaging, and safe learning environment (see, for example, Ontario English Catholic Teachers Association, 2024; Queen’s University, 2024).

It is interesting to note that Alberta, British Columbia, and Saskatchewan are part of the Association for Learning Environments (see page 19), but not Ontario or other provinces.

10 Ontario. (2023b). *Number of elementary and secondary schools by school board/school authority*. <https://data.ontario.ca/dataset/number-of-elementary-and-secondary-schools-by-school-boardschool-authority> (includes publicly funded schools only, 2022/2023)

11 Ontario. (2023a). *Facts about elementary and secondary education*. [https://www.ontario.ca/page/facts-about-elementary-and-secondary-education#:~:text=In%202022%2D2023%2C%20there%20were,Partnership%20Program%20\(%20ECPP%20\)%20facilities](https://www.ontario.ca/page/facts-about-elementary-and-secondary-education#:~:text=In%202022%2D2023%2C%20there%20were,Partnership%20Program%20(%20ECPP%20)%20facilities) (FTE in publicly funded schools, 2022/2023)

12 Statistics Canada. (2022). *Number of students in elementary and secondary schools, by school type and program type* (includes public and private/independent schools, 2021/2022.)

Figure 7. The Professional Learning Framework



Source: Adapted from Ontario College of Teachers (2016, p. 2)

Estonia

Number of schools	517 ¹³
Number of teachers	16,569 ¹⁴
Number of students	156,786 ¹⁵

Education in Estonia is characterised by a strong emphasis on quality and equity, with a focus on innovation, digitalisation, and inclusive practices (Education Estonia, 2023). Education is highly valued, and the country is noted for its educational equity, resulting in it being a top performer in PISA rankings (Education Estonia, n.d.; Republic of Estonia Ministry of Education and Research, 2024). The education system is overseen by the Ministry of Education and Research, and is guided by The Estonian Education Strategy 2021–2035 (Republic of Estonia Ministry of Education and Research, 2021), which is responsible for long-term development including national standards, national curriculum, educational funding, supervision, and quality assessment (European Commission, 2023a). The system is decentralised, meaning that schools enjoy considerable autonomy, developing their own goals, approaches within the national curriculum, and budgeting for teacher training. Three types of providers supply education: the state, particularly in vocational education; municipalities, dominant in pre-primary and general education; and private. Most students attend state schools (Santiago et al., 2016).

A report by the British Council (2021), identifies that Estonia lacks a coherent framework for effective types of professional learning, or systematic approaches to the evaluation of its effectiveness. Their recommendations are to define a framework and criteria for continuous professional learning and development to support teachers to remain in the profession, to make career pathways more attractive (with appropriate compensation for responsibilities), and to improve capacity to provide individualised support to all students (British Council, 2021).

In Estonia, teachers and school leaders are the primary agent of educational change, and, therefore, “external state controls take a backseat to initiatives that support educators in developing their own professional learning organisations” (Education Estonia, 2024). Hence, teachers have formed both regional and national subject associations for most subjects taught in the curriculum. Up until now, however, most professional learning has been provided externally, something the British Council (2021) policy recommendations suggest needs addressing.

Teachers are typically engaged in long-term courses (face-to-face and online), professional development networks, conferences, formal qualifications, peer observation, and coaching (Brandisauskiene et al., 2020). The Estonian Education Strategy 2021–2035 (Republic of Estonia Ministry of Education and Research, 2021) specifies that these professional learning opportunities need to address systematic implementation of innovative approaches to teaching and learning, but does not set out a framework for professional learning and development that outlines how this will be achieved.

Training and peer learning organised by schools generally takes place during school holidays. Participation in continuing education for teachers is free of charge (European Commission, 2023a). While teachers are expected to engage in professional development as described in the teacher standards, school leaders and teachers have autonomy in deciding on appropriate professional development activities (Leijen et al., 2023).

The career structure is related to professional standards that define competencies associated with career levels (Santiago et al., 2016). Teacher professional standards describe the nature of the work, and the set of skills, knowledge, and attitudes—that is, competence requirements—needed to successfully accomplish this work, which are then used to compile a curriculum vitae and award qualifications (Kutsekoda Foundation, 2024). Theoretically, the standards allow teachers to enter the profession, and then progress to senior and master teacher qualification levels, although shortfalls in the standards mean they have been poorly implemented and adopted (Pedaste et al., 2019; Santiago et al., 2016). The Estonian Education Strategy 2021–2035 (Republic of Estonia Ministry of Education and Research, 2021) sets out, in part, to address this, and identifies a number of key challenges for teachers, including the need to increase the extent to which a student-centred approach is adopted by teachers.

Spatialised professional learning and development

None found.

13 Republic of Estonia Ministry of Education and Research. (2024). *Statistics and analysis*. <https://www.hm.ee/en/ministry/statistics-and-analysis#indicators-of-teache> (schools for general education, 2020/2021)

14 Ibid. (number of teachers in schools for general education, 2020/21)

15 Ibid. (full-time study in general education schools, 2020/2021)

Finland

Number of schools	2,014 ¹⁶
Number of teachers	48,875 ¹⁷
Number of students	540,006 ¹⁸

The education system in Finland has received considerable attention in the past decade, noted for its strong performance in international standardised testing, resulting, in part, from its approach to teacher education, the status of teachers, and the quality of professional learning (Tonga et al., 2022). It is a broadly decentralised system, where teacher, schools, and municipalities have high levels of autonomy over decision-making (Niemi, 2015). In Finland, changes in political leadership do not commonly result in changes to educational policy, meaning change can be consistent and sustained (Federick, 2020). As Sahlberg (2009) concludes, rather than emphasising test-based accountability and externally determined learning standards, the Finnish system has instead developed policies that are based on equity, creativity, teacher professionalism, and mutual trust. Education in Finland is administered by the Finnish Agency for Education (EDUFI) (with responsibility for early to upper secondary, and adult education and training), under the Ministry of Education and Culture (responsible for publicly funded education, and higher education) (EDUFI, 2024). In Finland, a Master's degree is a prerequisite for teacher qualification (Mullis et al., 2016).

Finland's approach to teacher assessment differs significantly from many other countries. Instead of relying on standardised tests or a nationally regulated framework, teacher appraisal is managed at the local level. This decentralised approach aims to enhance teacher empowerment rather than using assessment as a top-down decision-making tool. In lieu of a standardised system, Finland places a strong emphasis on teacher education and professional accountability to ensure quality assurance in its education system. Teachers undergo extensive training and are entrusted with the responsibility of continuously honing their skills to meet the evolving needs of their students. In Finland, the teaching profession is held in high esteem, viewing teachers as experts with a unique societal mission. Teacher appraisal serves not as a means of individual assessment, but rather as a mechanism for identifying professional development needs and driving school-wide improvement efforts. This collaborative approach fosters a culture of continuous learning and development within the education community.

The state is primarily responsible for funding continuing education underpinning policy implementation. Most of this funding is channelled through EDUFI and the regional state administrative agencies. Institutions such as municipalities, universities, special needs institutions, and teacher training schools are among the organisations that can apply for these funds. In 2023, there were various focuses for state-funded continued professional development, including assessment, competencies, digital competencies, promotion of participation, well-being and safety, and cultural and language competencies (European Commission, 2023b). The Teacher Education Development Programme 2022–2026 (Finland Ministry of Education and Culture, 2022) describes the vision for teacher education as “creating the best competence for the world together” (p. 2). It aims for alignment between initial teacher education, induction, and continuous learning through developing the following:

- broad-based core competence
- expertise and action that creates new outcomes
- developing one's own competence and the educational institutions.

Teachers' professional learning is supported through various formal and informal activities, often set up through local municipalities teachers' associations, and teachers' own networks (Lavonen et al., 2023). The National Agency of Education is responsible for national-level implementation of educational programs and strategies (EDUFI, 2024).

16 Statista. (2023a). *Number of educational institutions in Finland in 2023, by type of institution*. <https://www.statista.com/statistics/526068/finland-number-of-educational-institutions/> (comprehensive schools, 2023)

17 Statista. (2023c). *Number of teachers in educational institutions in Finland in 2018, type of institution*. <https://www.statista.com/statistics/528843/finland-number-of-teachers-in-educational-institutions-by-type-of-institution/> (comprehensive schools, 2018)

18 Statista. (2023b). *Number of students in educational institutions in Finland in 2023, by type of institution*. <https://www.statista.com/statistics/526059/finland-number-of-students-by-educational-institution/> (includes both lower comprehensive school grades (grades 1–6) and upper comprehensive school grades (grades 7–9), 2023).

Schools have considerable autonomy in Finland. Teacher professional development is a comprehensive and continuous process that emphasises collaboration, reflection, and research-based practices. No statutory requirements govern teacher professional learning and development, although teachers are obligated to participate in professional development days dedicated to planning and training, typically three days a year. Professional development involves elements of self-motivated, employer-funded, and state-funded activities, and employers decide which training programs and forms of education are accepted as conforming to the collective agreement (European Commission, 2023b). As European Commission (2023b) reports, although professional learning does not provide teachers with formal benefits such as promotion or monetary gain, teachers generally participate in more professional learning than formally required, the main motivation being updating and renewing knowledge and competences as well as professional well-being. Teachers are obligated to participate in continuing professional development between one and five days a year according to the relevant statutes and collective agreements (European Commission, 2023b).

Finland does not have a system of teacher standards. Instead, it has a set of national aims and strategies that communicate ideas that are valued in the Finnish context; for example, extensive basic competence, transformative agency and innovative orientation, and continuous development of personal competencies (University of Helsinki, 2024).

Spatialised professional learning and development

Finland continues to go through significant developments in terms of their school learning environments (Duthilleul et al., 2018; Duthilleul et al., 2021; Siemplenski Lefort, 2023). To Niemi (2021), there is strong evidence of schools in Finland undergoing spatial change, to bring spaces and pedagogy into alignment, something that emerged at much the same time as the curriculum review in 2016. In research into the transition of teachers into innovative learning environments in six schools, teachers emphasised that there were changes in teachers' individual professional development; however, teachers emphasised the importance of collegial support in achieving this rather than specific professional development opportunities (Niemi, 2021). In a review of education infrastructure investment in the Finnish city of Espoo (Duthilleul et al., 2018), the authors highlighted the notion that teachers rarely receive professional development on the potential of pedagogical space as part of initial teacher education, explaining “teachers struggled with the design lexicon and had poor understanding of the design process and of the language surrounding the affordances of their school’s spatial arrangements” (p. 17). Their report strongly recommended “providing the necessary support for teachers to transition into new learning environments, by developing and implementing an Effective Spatial Professional Development programme” (p. 4). During this review, however, no relevant opportunities for spatialised professional learning for teachers were found, although it is agreed that training on the use of physical learning spaces is discussed as a part of other professional learning themes. Further, due to high teacher autonomy and a small number of obligatory annual professional development days, it may be challenging to ensure that all teachers develop spatial competency for the use of innovative learning environments.



Japan

Number of schools	35,168 ¹⁹
Number of teachers	1,470,000 ²⁰
Number of students	12,330,873 ²¹

Education in Japan prioritises the idea of holistic education, focusing not only on academic knowledge but also on nurturing students' social, emotional, and physical development (OECD, 2018). Teachers are noted as having a high level of professionalism, the ability to build trusting, productive relationships with students, and a high level of knowledge about learners and learning (McKnight et al., 2016). According to OECD (2018), assessments on an international scale have underscored the quality and equity of education in Japan. However, they also note that Japanese students tend to experience higher levels of anxiety and lower life satisfaction compared to their peers in other OECD countries. Recognising these challenges, Japan has initiated reforms in its education system to better align with the globalised landscape of the 21st century. The aim is to enhance overall well-being, broaden students' skill sets, develop competencies, and bolster their contributions to both the economy and society (Yamanaka & Suzuki, 2020).

The education system, including teacher education policy, is overseen by the Ministry of Education, Culture, Sports, Science and Technology (MEXT). Japan is organised into prefectures and municipalities, each with its own board of education responsible for school funding and employment of teachers (Jensen et al., 2016).

Until very recently, entrance to the teaching profession was highly competitive. Like in many countries, an aging workforce and the perception of hard work in the profession has decreased the number of young people seeking to apply. Nevertheless, teachers are very well regarded in Japan. After completing their initial teacher education, candidates must pass local examinations before being eligible for a position, and until recently teachers were granted tenure on initial hiring (Ahn et al., 2016; Chapple, 2023). The hours teachers are engaged in teaching students is lower than the OECD average; however, teachers work longer hours than average internationally, with up to eight hours allocated towards extracurricular activities per week (OECD, 2018; 2019). According to the Teaching and Learning International Survey (TALIS), this is especially the case for lower secondary teachers, who on average teach for 17.7 hours a week (TALIS average 19.3 hours) but work for 54 hours (TALIS average 38 hours), creating challenges for sustainable educational reform (OECD, 2018). In 2013, 86% of lower secondary teachers indicated that professional learning conflicted with their work schedule, the highest proportion across OECD countries (OECD, 2018). Japan does not have a national framework for teacher professional development, and most teacher professional development is run by educational boards of prefectural or local government.

19 Statista. (2022a). <https://www.statista.com/statistics/647533/japan-educational-establishment-number-by-type/> (elementary, lower secondary, upper secondary, and special needs schools, 2022)

20 Statista. (2022b). *Number of full-time teachers in educational institutions in Japan from 2013 to 2022*. <https://www.statista.com/statistics/1190920/japan-number-teacher-educational-establishment/#:~:text=As%20of%20May%202022%2C%20the,increase%20in%20the%20last%20decade> (includes elementary, secondary and tertiary. 423,400 in elementary, 2022)

21 Statista. (2023b). *Number of students attending primary and secondary schools in Japan in 2023, by institution type*. <https://www.statista.com/statistics/1189052/japan-number-students-primary-secondary-schools-by-type/> (includes elementary, lower and upper secondary, and special needs schools, 2023)

Teachers' professional learning and development is distinctly two-fold, split between formal and informal components. Ahn and others (2018) found that teachers often considered the informal to be of greater professional value than the formal. A significant characteristic of teaching in Japan is the extent to which teachers work together. Much of this takes place in the *shokuin shitsu*, the teachers' room (Ahn, 2016), a "home room" for teachers (and administrators) who constantly travel between classrooms during the day. In the *shokuin shitsu*, where teachers are allocated individual desks in their team, teachers engage in collaborative planning, designing lessons, assessing students' work, calling parents, and so on. Moreover, this is an important site for ongoing and unplanned discussion, reflection, and mentoring (Ahn et al., 2018). In addition, "lesson study" (*Jyugyou kenkyu*) is also a popular type of training especially for primary school teachers, designed to help them improve their teaching skills. (Mullis et al., 2016). This is a format where teachers identify a specific need in their classroom, investigate intervention options, and design a lesson plan to meet the need. One teacher uses this lesson design in their class, sometimes with colleagues observing, prior to a team discussion, reflection, and lesson refinement. The focus of lesson study is on improvement, with feedback focused on lesson design and the extent to which it was successful (Jensen et al., 2016; National Center on Education and the Economy (NCEE), 2024; Saito, 2012).

Teachers' professional development also takes place in more formal ways and has traditionally been closely aligned with teaching licence renewal. Novice teachers, in their first year in the profession, receive 60 days of in-school training with a consultant teacher and 30 days out-of-school training (Tonga et al., 2022). Local boards of education offer courses and workshops to improve teachers' instructional abilities and help teachers develop educational knowledge that is useful for instruction (Mullis et al., 2016).

Until 2021, teachers were required to undergo licence renewal every ten years to ensure they had up-to-date knowledge and skills. Under the teacher licence renewal (TLR) system, in place 2009–2022, teachers were required to undertake 30 hours of instruction in the two years leading up to their renewal anniversary. This comprised 12 hours of compulsory classes and 18 electives, to be completed at participating universities and held during school holidays, and at the teacher's expense (Chapple, 2023). According to Chapple (2023), this requirement has now stopped. Its replacement is currently unclear although it could possibly place more control at local board level (Japan News, 2021).

Japan does not have a specific list of standards for teachers. Instead, MEXT provides a detailed list of teaching and learning objectives in their current curriculum guidelines (McKnight et al., 2016).

Spatialised professional learning and development

Although there are repeated references to educational reform in Japan, with a move towards a more competency-based curriculum, references to the learning environment in which this takes place are limited. No details were found specifically regarding professional development around spatial competency.

New Zealand

Number of schools	2,538 ²²
Number of teachers	72,645 ²³
Number of students	831,038 ²⁴

New Zealand's education system is characterised by its progressive approach, commitment to diversity and inclusion, and focus on empowering students to become confident, lifelong learners. However, there are significant disparities between its low and high achieving students, a key area for schools to address.

Education in New Zealand/Aotearoa is overseen by the New Zealand's (NZ) Ministry of Education, which has overall responsibility for strategic development, policy, curriculum, and funding. The system is strongly decentralised, however, with government schools being self-managed and governed by parent-elected boards of trustees. These trustees appoint the principal and are legally responsible for the smooth running of the school (NZ Ministry of Education, 2024a; Wylie, 2020).

In New Zealand/Aotearoa, 85% of students attend state schools, 11% attend state-integrated (special character including faith-based) schools, and only 4% attend private schools (Figure. NZ, 2023). New Zealand is a bicultural nation. The state sector schools include Māori-medium education schools (kura kaupapa Māori) and English-medium schools. The former involves students who are taught all or some curriculum subjects in the Māori language for at least 51% of the time, and the latter involves students who are learning te reo Māori as a language subject or are taught curriculum subjects in the Māori language for up to 50% of the time. Schools either follow the New Zealand Curriculum or, in the case of Māori-medium schools (kura kaupapa Māori), Te Marautanga o Aotearoa, a curriculum based on Māori philosophies (NZ Ministry of Education, 2024b).

The Teaching Council Professional Growth Cycle for teachers (see Figure 8, Teaching Council of Aotearoa New Zealand, 2024a), implemented since 2021, is designed to support the shift from teachers providing proof of meeting standards for appraisal, to a system that supports growth and engagement in professional learning networks. The accompanying framework connects collaborative learning and teacher standards, with conversations and feedback, together designed to encourage reflective, trusted professionals.

Under the system of self-management, schools can determine local priorities for teacher professional learning. They can determine whether to apply for Ministry of Education's funded Regionally Allocated Professional Learning and Development (RAPLD), or whether to go direct to the professional learning source. RAPLD funding reflects changing national priorities; in 2024, these relate to structured approaches to literacy, National Certificate of Educational Achievement (NCEA) level 1 implementation, and assessment (NZ Ministry of Education, 2024c).

Teachers can engage in multiple forms of professional learning through, for example, continuing studies at university, communities of practice, communities of learning, courses, workshops, and in-school opportunities. Under the new Professional Growth Cycle for teachers (Teaching Council of Aotearoa New Zealand, 2024a), although the Teaching Council requires the presence of elements in the cycle, it does not dictate what this will look like for individual teachers, respecting the decisions of school leaders working alongside their teachers.

22 Education Counts. (2023). *Number of schools*. <https://www.educationcounts.govt.nz/statistics/number-of-schools> (includes state, state-integrated and private schools, 2023)

23 Education Counts. (2023b). *Teacher numbers*. <https://www.educationcounts.govt.nz/statistics/teacher-numbers> (includes teachers in state and state-integrated schools only, 2023)

24 Education Counts. (2023b). *School rolls*. <https://www.educationcounts.govt.nz/statistics/school-rolls> (includes state, state-integrated and private schools, 2023)

Figure 8. The Teaching Council Professional Growth Cycle for Teachers

The Code Ngā Tikanga Matatika			The Standards Ngā Paerewa			
Planning and design		Collaboration & implementation		Feedback		
Conversation for shared understanding of the <i>Standards</i> <i>Ngā Paerewa</i>						
	Design an annual cycle to foster collaborative learning					
		Using the <i>Standards</i> <i>Ngā Paerewa</i> In conversation about teaching and learning				
			Engaging in conversation and receiving feedback			
					Annual statement for certification	
Encouraging a reflective, highly trusted profession to benefit learners						
Principals and professional leaders will facilitate a common understanding of the <i>Standards or Paerewa</i> in their own context and what meeting and using them in their practice looks like.	Principals and professional leaders will design with teachers an annual cycle of professional growth in their setting, using the <i>Standards or Paerewa</i> and support teachers to engage in it.	Every teacher will engage in professional learning using the <i>Standards or Paerewa</i> to advance their understanding of the relationship between their professional practice and outcomes for learners.	Every teacher will be given the opportunity to discuss and receive feedback on their practice including observation, particularly for teachers holding Tōmua practising certificates.	Principals and professional leaders will confirm annually that each teacher has participated in the cycle and provide a statement to the teacher about whether they meet the <i>Standards or Paerewa</i>	If in the Principal or professional leader's judgment the teacher does not currently meet the <i>Standards or Paerewa</i> , they will discuss that with the teacher and provide support to enable improvement.	

Source: Adapted from Teaching Council of Aotearoa New Zealand (2024a).

As schools are self-managing, they generally make the decision on how time is allocated to professional learning. If required, under the Collective Contract, Ministry of Education schools may “call back” teachers for up to ten days to school during school breaks for teacher professional learning. In addition, there are instances whereby the Ministry of Education stipulates how time granted for professional learning should be used, providing additional days in which this must occur. In 2023–4, for example, four additional days are allocated to support implementation of the refreshed NZ Curriculum (NZ Ministry of Education, 2024d).

The Teaching Council of Aotearoa New Zealand is the professional body for New Zealand teachers (Teaching Council of Aotearoa New Zealand, 2024b). Teachers are required to be registered with the Council in order to teach, a three-yearly process which includes an endorsement from the school leader that the Code of Professional Responsibility and Standards for the Teaching Profession (Education Council New Zealand – Matatū Aotearoa, 2017) have been met, and that satisfactory professional development has been completed. Teachers now use the Professional Growth Cycle (Teaching Council of Aotearoa New Zealand, 2024a) to determine how they will meet the teacher standards, with the aim of advancing teachers’ understanding of the relationship between their professional practice and outcomes for students.

Spatialised professional learning and development

The reconstruction of 138 schools in Christchurch after the Canterbury earthquakes in 2010–2011 catalysed the development of innovative learning environments in New Zealand/Aotearoa schools and led to the establishment of Grow Waitaha. This was established as a collaborative partnership between the Ministry of Education, local iwi Ngai Tahu, and three independent providers of professional learning: Core Education, Leadership Lab, and Evaluation Associates. Grow Waitaha’s goal is “to enable schools and kura to reimagine education for young people across the region”, and revolves around four key ideas: futures, pathways, equity and inclusion, and well-being (Grow Waitaha, 2024). Post-earthquakes, a significant workstream was in supporting school, leaders, and teachers to navigate through significant physical redevelopment. Much of this involved developing pedagogical approaches, collaboration, and spatial competency, to help “support schools to explore, test and refine their ideas as they develop new spaces, pedagogies and cultures for learning” (Grow Waitaha, 2020). Professional learning is facilitated through communities of practice, and sharing resources and ideas together; the Grow Waitaha websites include resources, videos, and documents relating to this network of schools. Aspects of Grow Waitaha’s work, particularly in supporting schools to navigate changing physical spaces, was extended across the country, broadening the network of teachers and schools involved (Tārai Kura, 2024). A primary focus of Tārai Kura has been working with local iwi Māori in the co-design of school spaces. Another focus has been on offering professional learning through communities of practice, and sharing ideas and resources relating to school spaces, pedagogy, and design.

New Zealand/Aotearoa is part of Learning Environments Australasia (see description on page 15). Members of its New Zealand/Aotearoa chapter are actively involved in planning, designing, building, equipping, and maintaining school learning environments.

Republic of Ireland

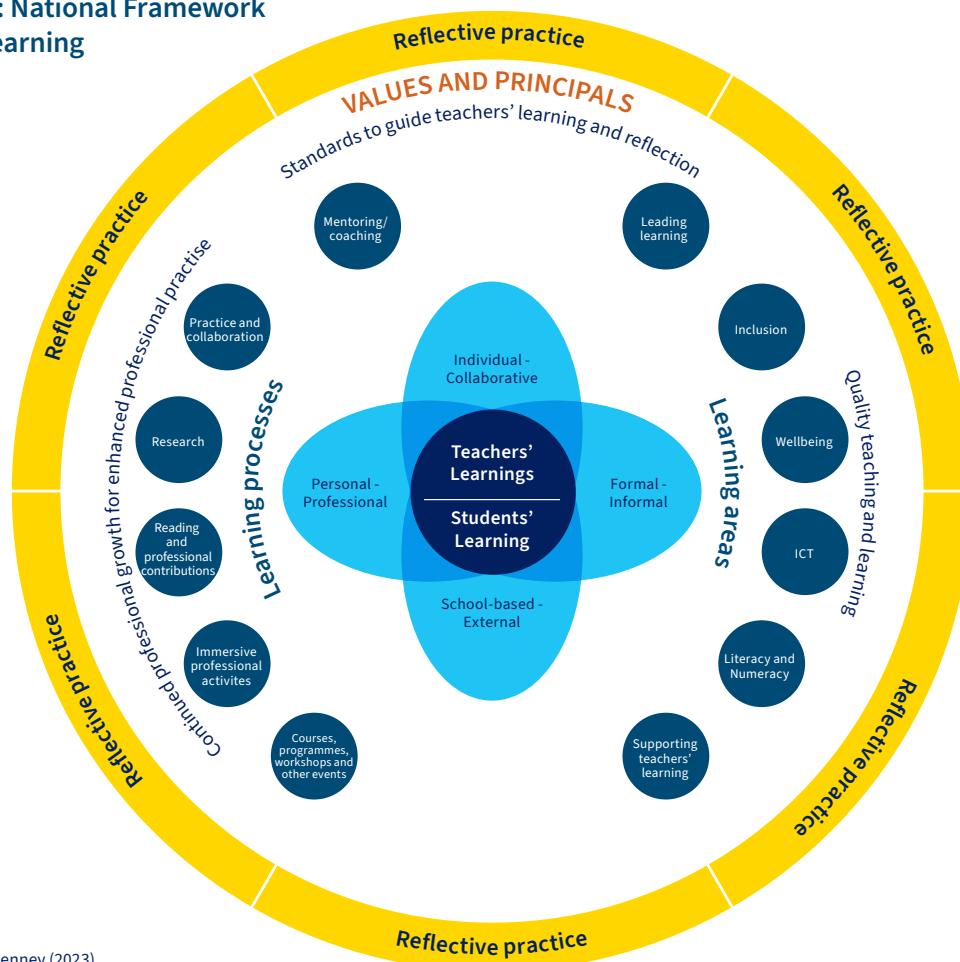
Number of schools	3,811 ^{25, 26}
Number of teachers	121,405 ²⁷
Number of students	964,535 ²⁸

The education system in the Republic of Ireland (Ireland thereafter) is centralised with responsibility lying with the An Roinn Oideachais Department of Education under the Minister for Education and Skills (An Roinn Oideachais Department of Education, 2024). An Chomhairle Mhúinteoireachta The Teaching Council acts as the regulatory body of the teaching profession and is responsible for teacher registration and standards, the promotion of professional learning, and the accreditation of teacher training programs (An Chomhairle Mhúinteoireachta The Teaching Council, 2024).

As reported by the European Commission, Ireland has displayed significant improvements in PISA scores, although there is slight disparity in literacy and numeracy (see Gilleece & Clerkin, 2024), with success in both achievement and in reduction of equity gaps between students of diverse backgrounds. This should serve as a guiding example of the importance of prioritising teacher support and equitable access to education (European Commission, 2024).

Cosán (Lifelong Professional Learning) is An Chomhairle Mhúinteoireachta The Teaching Council's framework to guide, support, and recognise teachers' ongoing learning, and post-induction into the profession (Figure 9). Central to Cosán is the notion that teachers are autonomous, responsible, and intrinsically motivated professionals, who are best placed to determine the impact of professional learning and therefore to prioritise the learning that will benefit them and their students most (An Chomhairle Mhúinteoireachta The Teaching Council, 2024).

Figure 9. Cosán: National Framework for Teachers' Learning



Source: Adapted from Devenney (2023)

25 Gov.ie. (2023b). Primary schools enrolment figures. <https://www.gov.ie/en/collection/primary-schools/#20232024>

26 Gov.ie. (2023a). Post-primary schools enrolment figures. <https://www.gov.ie/en/collection/post-primary-schools/>

27 An Chomhairle Mhúinteoireachta The Teaching Council. (2023). Ireland's national Register of Teachers grows to 121,405. go.unimelb.edu.au/nt98

28 Department of Education. (2023). Statistical bulletin—July 2023: Overview of education 2002–2022. go.unimelb.edu.au/6t98 (includes public and private schools 2022)

Cosán is underpinned by two standards: quality teaching and learning, and continued professional growth for enhanced professional practice. According to Devenney (2023), the framework has been developed by teachers for teachers and allows for flexible implementation. For example, professional learning could include mentoring and coaching, courses and workshops, research, or practice and collaboration. This takes place within learning areas: leading learning, well-being, ICT, supporting teacher learning, inclusion, and literacy and numeracy.

The Professional Development Services for Teachers (PDST, 2024), which has recently been retitled Oide (an amalgamation of various support services from the Department of Education), is Ireland's national support service offering professional learning opportunities to teachers and school leaders. They offer resources, workshops, webinars, and interactive online courses. Principals can apply for in-school support from Oide advisors. Current priority areas include improving literacy and numeracy, school self-evaluation, school-based and formative assessment practices, and well-being (PDST, 2024).

Ireland, like Denmark, the Netherlands, Norway, and Turkey, is one of five European countries where teacher professional learning is not mandated as part of teacher registration (King et al., 2023). King and others (2023) note the complexity involved in introducing Cosán, due to the number of institutions and professional bodies involved in the process. One challenge centred on the extent to which it would be mandated. Historically, Ireland has been one of the few OECD countries where teachers have not been obliged to undertake professional development (European Commission/EACEA/Eurydice, 2021). Initially a component of Cosán, the requirement was subsequently removed following extensive consultation, but it has yet to be seen how this will operate in practice (King et al., 2023).

Critically, Cosán does not stipulate professional development in terms of hours or credits and is not linked to teacher registration. It does, however, encourage “portfolio-based learning”; that is, cycles of planning, evidence gathering, reflection, and ongoing learning, individually or collaboratively, formally or informally (Devenney, 2023). Conceived in 2016, the intention is for it to be implemented systemwide by 2027, in collaboration with the Department of Education (Ireland Department of Education, 2016).

Spatialised professional learning and development

Barry and Raftery (2016), writing about schools undergoing curriculum reform in Ireland, recommended that the Department of Education should implement continuing professional development for teachers and principals in relation to learning space design that would support the changing nature of learning. This would focus attention on furniture acquisition and layout, engagement of students, and the relationship between pedagogy and space (Barry & Rafferty, 2016, p. 189). For this review, no details of specific programs relating to teachers' spatial competency or navigation of innovative learning environments were found.

Singapore

Number of schools	343 ²⁹
Number of teachers	53,416 ³⁰
Number of students	424,555 ³¹

Singapore has repeatedly featured in the highest achieving systems in international standardised assessments, resulting in its being held up as a model for less-well performing counties to investigate (Boman, 2020). Much of this has occurred as result of systematic educational investment and change since the 1980s, and recognition that, as a small country with no natural resources, prosperity needed to be driven by human capital (Gopinathan, 2012). Educationally, Bautista and others (2015) note that some of its success can be put down to the systematic way in which the Ministry of Education has examined “best practices” around the globe in terms of policy, curriculum, leadership, and professional learning.

Singapore’s curriculum is holistic in nature. It strongly emphasises growth in values and competences, specifically socio-emotional competencies such as social awareness, self-management, and relationship management; emerging 21st-century competencies, such as critical, adaptive, and inventive thinking; and communication, collaboration, and information skills (Singapore Ministry of Education, 2024).

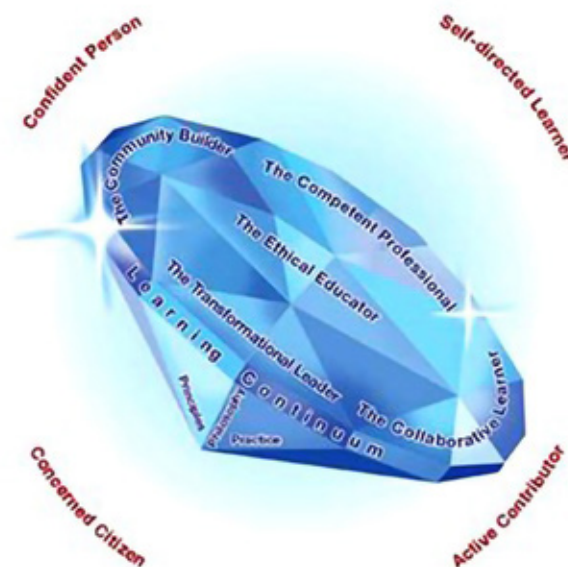
In Singapore, the teaching profession is held in high regard, and there is considerable competition to enter the profession (Bautista et al., 2015). Teachers report the most important qualities are about relationships, knowledge of learners, and dedication (McKnight et al., 2016). The profession is guided by the Singapore Teaching Practice Model, which identifies specific pedagogical theories and practices concerning lesson preparation and enactment, positive classroom culture, and assessment and feedback (Singapore Ministry of Education, 2024).

While there may not be formalised “teacher standards” in the same way as in some other countries, such as explicit lists of competencies or performance indicators, the Ministry of Education has established guidelines and frameworks that outline the expectations for teachers’ professional knowledge, skills, and behaviours. These frameworks provide a clear direction for teacher preparation, development, and evaluation.

In Singapore, teacher professional learning is guided by the Academy of Singapore Teachers (AST), under the Ministry of Education (Academy of Singapore Teachers, 2024a). The AST aims to build communities of practice for like-minded professionals of subject disciplines and for teachers to come together and learn from one another, developing stronger camaraderie and esprit de corps. Teachers in Singapore are given an allocation of 100 hours of professional development per year, a very high allocation. Teachers with different levels of expertise and career pathway have access to different professional development opportunities (Bautista et al., 2015).

The key framework used in Singapore is the Teacher Growth Model (TGM, see Figure 10), which serves as a guide for teachers’ professional growth and development throughout their careers (Academy of Singapore Teachers, 2024b) The model contains five teacher outcomes: the ethical educator, the competent professional, the collaborative learner, the transformational leader, and the community builder. The aim of the TGM is for teacher to autonomously engage in continual learning and to take ownership of their professional growth and well-being.

Figure 10. Singapore’s Teacher Growth Model (TGM)



Source: Academy of Singapore Teachers (2024b)

29 Ministry of Education Singapore. (2023). *Education statistics digest 2023*. <https://www.moe.gov.sg/-/media/files/about-us/education-statistics-digest-2023.pdf> (includes government and private schools—primary, secondary, mixed level, junior college/centralised institute 2022)

30 Ibid.

31 Ibid.

While the TGM does not prescribe rigid standards, it provides a flexible framework that allows for individualised professional growth plans based on teachers' needs and aspirations. The TGM encourages teachers to pursue professional development through multiple modes of learning, which are aligned with the competencies outlined in the TGM. These include face-to-face and online courses, conferences, mentoring and research-based practice, networked learning, reflective practice, and experiential learning.

Bautista and others (2015) determine that teacher professional development in Singapore is rigorous and of high quality. Specifically, it is subject-matter specific and connected to classroom practice, is intensive and ongoing, provides teachers with opportunities for active learning, prompts collaboration, and is coherent with teachers' needs. It is also aligned with national policies. Opportunities are either formal, such as online courses, postgraduate programs, mentoring and coaching, and conferences, or informal, such as peer observation, lesson study, action research, and independent study. The National Institute of Education (NIE, 2024), who runs most of the professional learning opportunities in Singapore (National Center on Education and the Economy, 2016), offers multiple opportunities for teachers to upgrade content knowledge and skills.

Other academies focus on professional learning opportunities for specific subject areas for in-service teachers; for example, the Singapore Teachers' Academy for the Arts (STAR), Singapore Centre for Chinese Language (SCCL), the English Language Institute of Singapore (ELIS), and the Physical Education and Sports Teacher Academy (PESTA). Established in 2003 as a joint venture between the Academy of Principals and Economic Development Board, Principals Academy provides educational resources and professional development to empower educators and learners "with necessary skills and opportunities to enhance their educational and professional development" (Principals Academy, 2003–2024).

Spatialised professional learning and development

A number of schools in Singapore have undergone spatial transition (Hui & Ng, 2023; Luo & Xiaobin, 2022) or refer to innovative learning environments and design on their websites (see, for example, Nexus International School Singapore, 2024; Singapore American School, 2024). The majority of these are in the private sector; however, newer government schools in Singapore are beginning to experiment with different learning spaces (see, for example, Eunoia Junior School, completed in 2024).

The Ministry of Education (2023) announced grants to support schools in enriching teaching and learning environments. The "School White Area and Canteen Grant" is available to transform learning spaces, such as by creating a makerspace or an environment hub with indoor farm, as well as incorporating activity zones for reading and tinkering in the canteen for multi-functional uses. Additional funding is also available for schools to progressively adopt new furniture and equipment, such as mobile furniture and LED display panels, to enhance the functionality of learning spaces to support a wider range of learning approaches and programs. More recently, Singapore's Prime Minister Lawrence Wong announced further plans to enhance the learning environments and infrastructure of schools in Singapore to create a conducive and supportive environment for students and teachers (Tushara, 2024).

In terms of specific professional development designed to develop teachers' spatial competency, one Dyason Fellowship project, funded by the University of Melbourne to one of the authors of this report, undertook a pilot project to develop teachers' spatial competency through a co-design and action research approach (Learning Environments Applied Research Network, 2024; Mahat & Loh, 2023; Mahat & Loh, 2024). Additionally, as a response to the ministry's grants, two full-day workshops were also held for educators organised by Principals Academy (Ahmad Anis, 2024). Ongoing online professional development modules are planned for 2025. Specific professional development for school library spaces have also been periodically conducted, with some schools using the Design Patterns Guide (Loh, 2020) to direct re-thinking and re-designing of library spaces (Loh & Pang, 2022).

South Korea

Number of schools	20,261 ³²
Number of teachers	533,649 ³³
Number of students	11,467,579 ³⁴

Education in South Korea is highly regarded globally for its rigorous academic standards, emphasis on excellence, and student performance in international assessments, achieving consistently strong results in PISA rankings. It has, however, also been criticised for its emphasis on memorisation and competition, and the accompanying stress it places on students, a phenomenon characterised as “education fever” (Dittrich & Neuhaus, 2023, p. 539).

Compulsory education in Korea starts at the age of six and continues until the age of 14 (OECD, 2023a). It is one of the shortest compulsory schooling periods among OECD countries, although 69% of 24- to 35-year-olds in the country go on to complete some form of tertiary education, the highest percentage worldwide (OECD, 2022). The Ministry of Education oversees the centralised system and is responsible for setting policy and the curriculum. Regional education offices have responsibility for school budgets and inspections (NCEE, 2024). Most schools are public, with about 15% being private, mostly at the secondary level. The private school system, however, works differently from the public system, in areas such as teacher recruitment, requirements for professional development, and promotion policies. This review will focus on the public sector.

Teaching is a highly sought-after profession, well paid and high status. Consequently, it is a demanding profession to get into, with teachers required to rank highly on a national Teacher Employment Test to qualify to teach in public schools (Mullis et al., 2016). On achieving this—only one in five secondary teachers pass the exam (NCEE, 2024)—teachers are permanently employed, and subsequently reassigned to a different school every five years (Yoo, 2018).

Professional learning opportunities are offered through both public and private providers, with private courses subject to government approval (NCEE, 2024). Courses include training for specific qualifications, in-service training, and special training opportunities that can include research sabbaticals or study abroad. Teachers have questioned the relevance of some of the mandated professional learning.

In part, this has led to the emergence of professional learning communities, which have now become accredited ways in which teachers can build up hours and engage in learning, with some positive results (Yoo & Jang, 2023). Of all teachers, 68.2% participated in a network of teachers formed specifically for the professional development of teachers in the 12 months prior to the TALIS 2018 survey (OECD, 2019). There have been other moves to shift to teacher-led models of professional learning (Hur, 2019). For example, to prepare teachers to implement the 2015 revision of the national curriculum, the Ministry of Education trained 13,000 teachers to facilitate professional development sessions at the school level (NCEE, 2024).

In Korea, teachers are expected to take part in at least 60 hours of professional development per year. This is dictated by ministry’s policy and determined by provincial education offices (Hur, 2019). Professional learning in Korea is closely tied in with aspects of performance and career advancement, particularly in roles of principals; master teachers, for which teachers need 15 years’ experience before applying (Kim, 2014); or education specialists, such as inspectors or researchers (NCEE, 2024). Teachers earn points through professional learning, experience, and performance. Teacher performance, assessed under the Evaluation of Teacher Professional Development system by peers, school leaders, students, and parents determines next steps for teachers. The highest-scoring teachers become eligible for sabbaticals to focus on research for up to a year, while lower-scoring teachers may be required to pursue up to 60 hours of professional learning in an approved institution (Yoo, 2018). Korea does not have a national framework for teacher professional development.

Spatialised professional learning and development

Spatial innovation is typically driven at the school level. Schools are encouraged to apply for several grants for building innovative learning environments. For instance, the Korea Education Fund is a non-profit organisation established in 2005 to help improve education conditions and environments, and to raise the quality of education in schools at all levels using state and donor funds (Korea Education Fund, 2024). The Korea Advancing Schools Foundation Act also supports the improvement of the educational environment of private schools through the establishment of the Korea Foundation for the Promotion of Private School (Korea Advancing Schools Foundation Act, 2021). No available information, however, exists on spatialised professional learning for teachers.

32 Ministry of Education. *Statistics: Overview*. <https://english.moe.go.kr/sub/info.do?m=050101&page=050101&num=1&s=english> (includes national, public and private schools)

33 Ibid. (includes national, public and private schools)

34 Ibid. (includes national, public and private schools)

United Kingdom

The United Kingdom is made up of England, Scotland, Wales, and Northern Ireland. Each country has its own department of education, responsible for development and implementation of policy. This includes funding, curriculum, and quality and improvement in teaching and learning.

Note: where references are to the UK Government, they relate to England.

United Kingdom, England

Number of schools	24,442 ³⁵
Number of teachers	468,371 ³⁶
Number of students	8,869,910 ³⁷

In England, overall, educational policy and funding is overseen by the Department for Education (DfE). In turn, local authorities (Councils) are responsible for policy implementation, school funding, infrastructure, improvement, and access to school (Local Government Association, 2019). The Office for Standards in Education, Children's Services and Skills (OFSTED) holds responsibility for the inspection and regulation compliance of schools. Teachers in England must be registered with the General Teaching Council for England.

Schools fall into private and publicly funded categories with state-funded schools including those maintained by local authorities (Councils), voluntary-aided schools (mostly of a religious nature), academies, and free schools. Academies, often grouped and owned by Multi-Academy Trusts (MATs), and free schools are government funded but independent from local control and consequently able to diverge from the national curriculum. Academies were originally set up in England in 2000 to improve failing schools. They are run by not-for-profit companies (Gov.UK, 2024; Mullis et al., 2016). There is no national framework for teacher professional learning in England; however, there is a "Core Content Framework" for all pre-service teacher training and the "Early Career Framework" for teachers in their first two years of teaching (UK Department for Education, 2024).

The document, *Standard for teachers' professional development*, sets out expectations for teacher professional development (UK Department for Education, 2016). It notes that professional development should be focused on improving and evaluating student outcomes, underpinned by robust evidence and expertise, inclusive of collaboration and expert challenge, sustained over time, and prioritised by school leadership.

A new system of national professional qualifications (NPQs), available since November 2021, enable teachers, middle leaders, and senior leaders to develop their expertise in specialist areas of teaching or leadership. Specialist NPQs are designed to support classroom teachers in areas such as leading teaching, leading behaviour and culture, and leading teacher development. Leading teaching, for example, is designed to help teachers gain skills and confidence in creating a culture of high expectations, supporting colleagues with all aspects of their teaching, and contributing to effective professional development linked to teaching, curriculum, and assessment. It takes teachers 12 months to complete, with about one to two hours of study each week. There are currently 11 providers delivering NPQ courses to teachers, and teachers can access funding to support their learning (OFSTED, 2023).

Some criticism has been levelled at the system of professional development for teachers in England. Bubb and Ince (2023), for example, note that the complexity of school funding models, especially since the development of MATs, has led to a disparate approach to professional development. The independent review conducted by OFSTED (2023) found that although teachers perceived improving their practice as a priority, workload pressure was frequently cited as a barrier to participating in training and development. Only 52% ($n=1711$) of teachers felt that their professional learning was prioritised by school leaders.

35 Gov.UK. (2024a). "School characteristics" from "Schools, pupils and their characteristics". <https://explore-education-statistics.service.gov.uk/data-tables/permalink/451e7e8b-e541-4501-e9f1-08dc0dc60f26>

36 Gov.UK. (2023b). School workforce in England. <https://explore-education-statistics.service.gov.uk/find-statistics/school-workforce-in-england>

37 Gov.UK. (2023a). Pupil characteristics—number of pupils by age and gender" in England for 2022/23. <https://explore-education-statistics.service.gov.uk/data-tables/school-pupils-and-their-characteristics/2022-23?subjectId=25b9c86f-6235-4690-a62f-08db5b647393>

Bubb and Ince (2023) report that some schools are moving away from traditional teacher development courses towards professional learning communities and networks, and that some schools have established their own research hubs. The research hubs are supported by the Education Endowment Foundation (EEF), a charity established in 2011 to improve the educational outcomes of disadvantaged children in England. The hubs aim to provide teachers with the opportunity to access, understand, and apply evidence, and to improve their quality of teaching and learning, especially for children from socio-economically disadvantaged backgrounds. They also offer some teachers an alternative career pathway (EEF, 2024). There are currently 33 of these research hubs, spread across the country (Research Schools Network, 2024).

Teachers engage in learning in multiple ways. They can engage in professional learning through in-school training days (INSET) and out-of-school training days. They can also engage in online courses, professional reading, visits to other schools, conferences, peer observations, coaching, and participation in teacher networks. A recent report found that INSET days tended to focus on school policy, rather than prioritise classroom practice (Allen et al., 2024).

In England, continuous professional learning is non-statutory, although schools are expected to provide training and development opportunities for teachers. Many schools use the Teachers' Standards to assess individual teacher needs and identify relevant areas for professional learning. The Teachers' Standards (UK Department for Education, 2021a) apply to all teachers in the government-funded sector and relate to teacher appraisal. Professional judgements of head teachers and appraisers are central to the appraisal system. They are asked to "assess teachers' performance against the standards to a level that is consistent with what should reasonably be expected of a teacher in the relevant role and at the relevant stage of their career" (p. 6). Teachers are expected to use the standards to review their practice, frame observations and feedback, and to inform next steps for continuing professional development (UK Department for Education, 2021b).

Spatialised professional learning and development

Although the term "innovative learning environment" is a familiar one in the English context, professional learning pertaining to developing teachers' spatial competency was found to be quite limited. The Master of Science, Learning Environments, from University College London, extends students' knowledge of the complex interrelationships between learning and the physical and digital environments (University College London, 2024). The Association for Learning Environments Europe (2024c) provides some events and meetings for their members. Collaborative ReDesign with Schools (CoReD), co-funded by Erasmus+ Programme of the European Union, provides tools and case studies for use within learning environments (CoReD, 2024).

United Kingdom, Scotland

Number of schools	2,529 ³⁸
Number of teachers	54,033 ³⁹
Number of students	705,528 ⁴⁰

Education Scotland is the government executive agency charged with supporting quality and improvement of teaching and learning, professional development of teachers, and improved learning experiences and outcomes for students. Education Scotland is accountable to Scottish ministers for its management, performance and development, but operates independently and impartially (Education Scotland, 2024a).

The General Teaching Council for Scotland (GTCS), however, is the independent regulator for teachers in Scotland (GTCS, 2024a). GTCS Professional Standards set out what it means to be a teacher in Scotland—values and “ways of being”. They act as benchmarks for registration or fitness to teach, as well as providing a framework for signposting development and learning (GTCS, 2024b). Scottish nursery, primary and secondary schools are either public or independent. Unlike the English system, there are no academy or free schools in Scotland (Scotland, 2024).

The Curriculum for Excellence, first introduced in 2016 and “refreshed” in 2019 (Education Scotland, 2024b), is a coherent curriculum for children three- to 18-years-old, designed to create opportunities for all children to “develop the knowledge, skills and attributes they need to adapt, think critically, and flourish in today’s world”. The curriculum articulates a need to develop successful learners, confident individuals, responsible citizens, and effective contributors, through challenge and enjoyment, breadth, progression, depth, personalisation and choice, coherence, and relevance.

Education Scotland (2024b) identifies five key areas to underpin the continuous process of taking curricula goals and turning them into practice or what is known as “curriculum making”:

- understanding the learners
- knowing the big ideas
- knowing your own learning and support needs
- using meaningful learning networks
- being clear in practical approaches.

Teachers’ professional learning and development is linked to this through the national model of professional learning (Education Scotland, 2024b). The national model (Figure 11) sets out key principles underpinning the nature of professional learning, and its links to teachers’ standards, leadership, and student learning. It states that professional learning should be collaborative, developed through enquiry, and deepen knowledge and understanding.

The Professional Standards for Scotland’s Teachers are designed as a means for teachers to engage in professional learning to “affirm, inform, shape and guide professional development and practice” (GTSC, 2024a). Teachers maintain their registration through the ongoing process of engagement in professional learning and professional review and development, or otherwise known as Professional Update (GTSC, 2024a). Teachers can access a variety of forms of online and in-person professional learning. Education Scotland offers and endorses a range of courses for teachers. These courses, or Professional Learning Activities (PLAs), can be undertaken alone or with colleagues (Education Scotland, 2023). The Standard for Career-Long Professional Learning (GTSC, 2021) stipulates that teachers should engage critically with literature, research, and policy, and in reflective practice to develop and advance career-long professional learning and expertise.

In 2024, the Strategic Board for Teacher Education (SBTE) was tasked to map the teacher education landscape and develop a framework for teacher education and development with agreed principles underpinning it. The framework will be mapped against career pathways and underpinned by the GTCS Professional Standards (GTCS, 2021), and builds on the principles and features of professional learning identified in the National Model of Professional Learning (Education Scotland, 2024c). At the time of this report, a conceptual model has been proposed through ongoing stakeholder engagement (SBTE, 2024) and it foregrounds the criticality of a coherent, progressive, and supported continuum of teacher education.

38 Tes reporter. (2024, 17 January 2024). How many schools are there in the UK? *TES Magazine*.

39 Tes reporter. (2024b, 18 January 2024). How many teachers are there in the UK? *TES Magazine*.

40 Scottish Government. (2023). *Summary statistics for schools in Scotland 2023*. <https://www.gov.scot/publications/summary-statistics-for-schools-in-scotland-2023/pages/headline-school-and-early-learning-and-childcare-elc-statistics/>

Figure 11. Scotland's National Model of Professional Learning



Source: Adapted from Education Scotland (2024c)

Spatialised professional learning and development

Scotland has had a history of school building innovation (Education Buildings Scotland, 2019) managed through the Scottish Futures Trust in conjunction with public and private sectors. In April 2021, for example, the Trust delivered the last of 117 new schools since Scotland's Schools for the Future program was launched in 2009 (Scottish Futures Trust, 2024).

Several resources are available to support teachers and schools. For example, the Shared and Agile Learning Space Design Toolkit (Future Schools Edinburgh, 2024) is designed to support students and teachers collaborate on the design of educational spaces. It introduces teachers to learning typologies (such as campfires, caves and watering holes, after Thornburg, 2004), learning design values (such as well-being, ownership, and kindness), and learning design factors (such as safety, furniture, digital, and natural space).

Inspiring learning spaces (Architecture and Design Scotland, 2017) highlights 20 case-study schools developed as part of the Scottish Futures Trust Inspiring Learning Spaces initiative. Started in 2014, it encouraged schools to look at spaces that could be transformed to reimagine teaching and learning. The Inspiring Learning Spaces Toolkit (Scottish Futures Trust, 2018) takes schools through a process from needs analysis through to evaluation for a similar scale project. It includes the question "Do we have gaps in staff knowledge or training that we need to address?" (p. 23), along with an example in North Ayrshire of a school's annex that was turned into an innovative learning environment, within which to learn and trial new approaches.

Campbell (2019), in evaluating one school's Inspiring Learning Space (combining three standard-sized classrooms into one L-shaped teaching space), noted that the local authority funded an additional staff member to coordinate professional learning for teachers and to "act as a champion for the space" (p. 191). Led by the coordinator, staff were engaged in professional learning sessions, provided access to online resources, and given opportunities to explore how best to use the space. Campbell (2019) reports that the scheme was largely successful, especially in raising awareness and discussing spatial innovation. However, given the collaborative nature of the space, planning time was raised as an issue.



Discussion

The findings section provides the results of the environmental scan in detail, with countries listed in alphabetical order. Table 1 in the Executive Summary provides an overview. In this section, we provide a synthesis of the findings.

The scan has illustrated the range and variation of approaches to teacher PLD adopted internationally. Conceptually, much of the approach is determined by the level of autonomy enjoyed by the school. There is a strong contrast between those with considerable choice versus those with centrally governed demands for teacher education. A difficulty in a scan like this is in accessibility to relevant documentation and language. The findings prompt reflection on:

- the nature of PLD internationally
- the provision of PLD specifically concerning building teachers' spatial competence
- the quality and quantity of material available from which to enhance understanding.

Professional learning and development

The scan has illustrated the range and variation of approaches to teacher PLD adopted internationally. There is variation in the terminology used (PLD, PDL, CPD, PL, PD). There are variations also in the extent to which PLD is mandated by the education system (often in conjunction with national priorities); the extent to which it is delivered or negotiated; the extent to which it is connected to teacher professional standards (if in fact they exist); the ways teachers access PLD opportunities; the agency they have over deciding what they will invest time into; and the extent to which there is an identifiable national approach. PLD also varies in the way it is weighted, either to ongoing learning or to career advancement and specialisation. The degree of disparity between international contexts should in no way be surprising: the countries selected represent a broad range of social, political, and educational differences.

Teachers experience significant variation in the degree of autonomy they hold over their PLD. In countries like Finland, Ireland, Scotland, and Estonia, for example, a high level of teacher autonomy is coupled with an emphasis on teachers as lifelong learners and reflective practitioners (Jones et al., 2023). In other countries, such as Japan and Korea, PLD is more heavily mandated, with prescribed requirements determining how much time is required to be undertaken and documented. This is, in part, not only a reflection of the degree to which the educational systems are centralised or decentralised but also a reflection of the way educational reform and improvement are approached.

There is evidence too of considerable variety in how PLD is undertaken. With the Kennedy (2014) model as a guide, examples of each component—training, award-bearing, deficit, cascade, standards-based, coaching/mentoring, community of practice, action research and transformative—can be found. For instance, some PLD is delivered akin to a skills-based training model, delivered by an expert and often off-site. It highlights the belief that a standardised approach to PLD leads to improvement in student learning, and, although effective in part, it often fails to have long-term impact (Kennedy, 2014). At the other end, there are also multiple examples of transformative practices in professional learning, where teachers are driving their own learning, are part of teacher networks, and are engaged in negotiating personal priorities, actioning new learning, and evaluating their impact as a result.

Additional complexity emerges from the multiple types of schools—that is, government, secular, or private, or variations of these such as “academies” in the UK—each of which potentially have differing approaches to PLD. In this scan, information was generally sourced that pertained to government sector schools.

Spatialised professional learning and development

The scan specifically looked at PLD in the context of teachers' spatial competency. Finding information proved to be challenging, as there were a couple of key overlapping areas. First, PLD connected with the "learning environment" tended to relate to aspects of classroom management or learning how to create inclusive, engaging, and positive places for learning. Second, PLD connected to "spatial" competency tended to illuminate learning related to mathematical and spatial reasoning, rather than to aspects of the physical learning environment.

This led to some reflection on adequacy of the search term. The term "spatial" has only been used in the context of learning environments since the early 2000s (Fisher, 2004), leading to the question as to its broad-scale usage. "Spatial" and "spatiality" have generally been academic terms used to describe the interaction of teachers with school space, historically, geographically, and pedagogically. The notion of "spatial competency" has only recently gained currency (Leighton, 2021). It could be unsurprising, therefore, that this term does not emerge as a frequently used descriptor. Despite that, substituting "environmental competence" or teaching "in innovative learning environments" for "spatial competence" revealed no additional examples of PLD. This leads us to consider two things: first, that the PLD is not occurring, and second, it is occurring but cannot be detected in the same way.

Examples of PLD designed to support teachers, spatially, when working and teaching in innovative learning environments were found. They included professional networks (New Zealand), University-based micro-certification courses (Victoria), online resources (New Zealand, until recently New South Wales), learning about makerspaces (British Columbia) and learning environments (England), and action research tools (England).

In some situations, it was clear that PLD had taken place in schools, particularly in the lead up to school redevelopments and prior to teachers working in innovative learning environments (see, for example, Victoria and New South Wales). This is generally evidenced through academic case-study material (see, for example, Blackmore & O'Mara, 2022; Mahat & Bradbeer, 2024; Morris & Imms, 2023), and examples of ongoing in-school PLD (see, for example, Charteris & Smardon, 2018; Mahat & Awad, 2023). Blackmore and O'Mara (2022) suggest that principals played a critical role in providing opportunities for teachers' PLD, encouraging experimentation, action research, co-design, and collaborative reflection. Time was a considerable factor, with teachers engaging in team teaching requiring additional time for co-planning and preparation.

Of note here is the idea that often spatial innovation was an outcome of addressing a specific problem, such as lack of student engagement in learning, or a shift in approach to curriculum. Hence often PLD was dedicated to innovating pedagogically; for example, a shift towards more personalised approaches, or more student-centred methods of teaching. Information on such PLD, particularly at school levels, was not readily available.

What would be of interest is identifying the specific aspects of spatial competency required by teachers, how these have been addressed through PLD, and what has been found to be effective and impactful. Much has been written on how teachers adapt to practising in innovative learning environments (see, for example, Alterator & Deed, 2013; Campbell et al., 2013; Niemi, 2021; Saltmarsh et al., 2015), less about how teachers learn.

In terms of PLD related to spatial competency, the scan identified examples of small-scale, relatively niche interventions, reiterating that individual schools have clearly undergone spatial innovation. Less available is information about how they incorporated PLD, or who supported the process. An assumption could be that where schools identify a need to engage in teacher PLD about spatial competency, it is dealt with at a very local level, with schools engaging directly with relevant experts. Another assumption might be that short-term PLD in this area occurs “just in time”, in schools undertaking spatial innovations and changes, and is possibly not viewed as something teachers need to engage in otherwise. Given the extensive range of PLD teachers are expected to be undertaking in schools, one question might be, how long should PLD relating to spatial competency last for?

The limited information available suggests that in those cases where PLD opportunities were available, it was not connected with strategic, broad-scale national initiatives around spatial innovation. This is not surprising as few countries have embarked on such a building strategy, and where they have, it has not always been sustained. At the system level, the Sydney Catholic Schools, and New South Wales and New Zealand school systems remain outliers. Sydney Catholic Schools has been running the Sophia program, a professional development and action research program in conjunction with the University of Melbourne for the last three years. The New Zealand Ministry of Education’s initiative Grow Waitaha, and its spin-off Tārai Kura offer more comprehensive frameworks of professional learning and transition. In New South Wales, the Futures Learning, and School Learning and Environment Change teams under the Department of Education previously supported schools with infrastructure and pedagogical support, including offering online modules in using innovative learning environments and teacher collaboration. Changes in priorities within the department have since rendered both teams redundant, and the extensive support material developed, now unavailable.

The political nature of educational policy in many jurisdictions also has an impact on the availability of PLD. Changing educational priorities are reflected in PLD, particularly where this is mandated in schools. In the case of New South Wales, changing educational objectives have moved spatial competency out of their PLD agenda. Further inquiry to ascertain what the “state of play” is in terms of spatialised PLD internationally would be useful.

Quality and quantity of information

At the outset, it was inevitable that the scan would have limitations. First, language was a key barrier. Although translation tools like Google Translate could be used, the language of initial searching was English, so it frequently precluded national language websites from appearing in searches. In some situations, third party interpretations could be used such as work authored by organisations such as the OECD.

Second, and coupled with this, was the limitation of terminology. The scan used a list of search terms; for example, “teacher professional learning”, “teacher professional development”, “teacher professional learning and development”. It is possible that different and varied terminologies have been used by education systems that have not been picked up by the review.

Third, the scan was limited by the availability of resources and information. Official national ministry or department websites were considered primary documentation but varied considerably in the quantity and quality of information they made available. Several reasons could be attributed to this: information and material availability, and what they wanted to be publicly publish, or their capacity to do so. For example, there was significant difference between publicly available information on teacher professional learning in British Columbia and Ontario, and although both were in Canada, the former contained little description. This does not mean there were no frameworks available about PLD in that province, just that it was not possible to find this through the usual channels. In addition, in some jurisdictions, resources were in the process of being updated or needed updating. In Japan, for example, under the Teacher License Renewal (TLR) system, in place since 2009, teachers were required to undertake 30 hours of instruction in the two years leading up to their renewal anniversary. Although reports were located from 2021, this approach had been discontinued and details of what has replaced it were unable to be found.

Finally, a significant limitation of the environmental scan is that the information remains largely at policy level. In drawing on primary and secondary document sources, the scan does not report the extent to which guidelines and frameworks are implemented in schools, nor does it evaluate the extent to which they are successful.

Conclusion

The purpose of this environmental scan was to develop a better understanding of the way teacher PLD is applied internationally, and to see how it has been applied in the context of spatial competency.

The underlying intention was to inform the Australian context and provide information to support the development of a spatialised professional learning program. Teachers' spatial competency is of deep relevance, given the large-scale investment in school infrastructure, and the innovative nature of many of the spaces constructed. Here, "spatial competency" is used as the term to describe the knowledge and skills teachers need to maximise spatially the use of their learning environment.

The key question driving the environmental scan was "What models of teacher professional learning and development currently exist globally?" Understanding this required investigating a set of international contexts, and for each one finding out how PLD is provided for teachers, the extent to which it is mandated and/or connected to teacher professional standards, and whether it used an identifiable framework. The scan investigated ten international contexts based on criteria of having similar education systems to Australia or being successful OECD/non-OECD countries: Australia (New South Wales and Victoria), Canada (British Columbia and Ontario), Estonia, Finland, Japan, New Zealand, Republic of Ireland, Singapore, South Korea, and United Kingdom (England and Scotland). The countries were selected as either examples of successful systems (Brinkerhoff, 2003), or examples of educational systems similar to Australia, or education systems where spatial innovation had led to parallel innovation in professional learning. The scan used publicly available documents sourced online, including ministry and department websites, grey literature from professional bodies, and white literature from academic papers. The findings discussed in this report provide some important implications and areas of future inquiry.

A finer grain study of a smaller number of jurisdictions, going beyond a desktop search, may prove fruitful especially if it involved representatives of government education departments, professional bodies, and schools undergoing spatial change. Some guiding questions for future research:

- What do teachers need? What professional learning in teacher spatial competency would be of value?
- How is the PLD most usefully be made available? Is it online, through packaged resources, curated websites, or webinars? Or is it offline, through networks of teachers, visiting experts, or action research?
- How do we know what is working in this area? To what extent is the PLD useful, sustained, and impactful?
- In terms of teacher standards, how might teacher spatial competency be most beneficially added or absorbed into the current system?

The next step for the project team is to gather Victorian teacher's perspectives on their spatialised professional learning needs. This phase involves an online survey to identify the professional learning needs and preferences of Victorian teachers. The outcome for this phase is to develop a PLD program on spatial competency that is aligned to the Australian Professional Standards for Teachers. The subsequent aim is to validate the spatialised PLD program. This phase involves a set of fine-grained case studies of individual schools or school groups across government, Catholic and independent schools in Victoria to investigate the impact on teacher and student variables. With large sums of money being spent on school buildings and infrastructure, this study contributes significantly to yield positive social and educational outcomes by supporting Australian teachers with the development of their spatial competency to improve the learning and outcomes of all students.

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