

KNOWLEDGE IS POWER II

Australia's teacher professional knowledge gap

Trisha Jha





A catalogue record for this
book is available from the
National Library of Australia

KNOWLEDGE IS POWER II

Australia's teacher professional knowledge gap

Trisha Jha



This research was generously supported by McKinnon.
CIS retains responsibility for the views expressed.



Analysis Paper 117

Contents

Executive Summary	1
Introduction	3
Why measure teachers' beliefs and knowledge	4
Teachers' mental models of how students learn are consequential	4
Current evidence suggests there are important gaps in teachers' knowledge	4
Existing measurement tools are inadequate	5
About the survey approach	6
Results from the survey	7
Learning and teaching grounded in human cognition	8
Attention and learning	8
Testing effect	9
Learning and teaching individualised	11
Student interest	11
Learning pyramid	12
Applying knowledge of learning to instructional choices	13
Whole-class teaching	13
Problem solving	14
Implications of the results	16
Conclusion and recommendations	19
Recommendations for federal, state and territory policymakers	19
Recommendations for schools and school systems	20
Appendices	21
Appendix A: Sample details	21
Appendix B: Full item list	22
Appendix C: All items results	23
Appendix D: Distributions of total items correct by group	24
Endnotes	26

Executive summary

Teachers' professional knowledge is a key component of teaching quality. Education policy increasingly seeks to be more specific about teachers' expected professional knowledge to align it with the best available evidence on how students learn. But reforms to initial teacher education and classroom practice, while welcome, leave a key unanswered question: how do systems know what teachers already know when it comes to the science of learning?

Informed by earlier research (see *Knowledge is Power: What teachers believe about learning*), this report presents the results of a 10-item survey of a broadly representative sample of 377 Australian teachers, examining whether teachers have been equipped with the professional knowledge they need to make effective instructional decisions in the classroom.

The survey found:

- Overall, teachers' knowledge of ideas related to the science of learning was low (a mean correct score of 4.53 out of 10, with only 4% of respondents answering 8 or more correctly) and uneven.
- Clear majorities of teachers believed in the 'learning styles' neuromyth (88%) and the myth that students learn little from lecturing or reading but learn a great deal from doing activities and teaching others (65%).
- A plurality of teachers believed testing tends to detract from learning (41%), and that students learn better through discovery than through explicit instruction (38%), despite these positions not being consistent with the science of learning.
- A plurality also believed whole-

class teaching cannot be effective because every student learns differently (39%), although responses on this item were highly divided.

- Clear majorities correctly recognised that attention is necessary for learning (96%), that problem solving needs to be practised in context (92%), and that the brain can process only a limited amount of information at once (74%).
- No majority position emerged on whether students need previous interest to learn or on the strength of the evidence for project-based learning, and neutral responses were substantial on several questions, including project-based learning (36%), discovery learning (32%), previous interest (31%) and testing (31%).
- Overall knowledge scores did not differ reliably by level of schooling taught, gender or age.

The findings point to a deeper problem than isolated misconceptions: Australian teachers do not appear to share a coherent and consistently evidence-aligned body of professional knowledge about how learning occurs, and how that knowledge should inform instruction.

Crucially, teachers' science of learning knowledge does not appear to increase with age or experience. The findings therefore provide little reason to assume this professional knowledge will develop organically; policymakers and system leaders need to make conscious efforts to build it across the teacher life cycle to better support teachers.

The report recommends policymakers should:

1. Strengthen initial teacher education

by ensuring the Strong Beginnings core content recommendations are implemented and assessed.

2. Reform the Australian Professional Standards for Teachers to more closely resemble England's Early Career Framework.
3. Move away from portfolio-based processes and towards knowledge-based ones to certify teachers at different career stages.

Schools and school systems should:

1. Build coherent mental models that bridge theory and practice for teachers, rather than isolated techniques.
2. Use knowledge-based formative assessments to help inform teacher professional development approaches.

Introduction

It is not typically disputed that teachers' professional knowledge and capacity is central to student outcomes. But the logical next question — what specific knowledge and capacities do we expect or desire teachers to have? — is not often addressed, except in vague generalities. The publication of the Strong Beginnings report in 2023, with its additions of core content for teacher education degrees, sought to shed some light on that question. Its core content recommendations essentially argued that Australian teachers need to know (and have capacity to implement) teaching approaches associated with the 'science of learning': the cognitive science of how students learn, connected with the instructional implications of that science.¹ The agreement of Australian education ministers to the major reform recommendations in Strong Beginnings represented a landmark acknowledgement, at the policymaker level, of this body of knowledge.

Previous CIS research has identified gaps in teachers' science of learning knowledge as important barriers to greater use of science of learning-informed teaching practices.² Subsequent research (*Knowledge is Power: What teachers believe about learning*, henceforth 'KIP Part 1') canvassed the available literature on what teachers believe about learning, exploring whether these beliefs represent true constructs about how learning occurs or false (often called 'neuromyths'). While the existing literature is varied, the analysis suggests good reason to believe teachers lack accurate knowledge about how learning happens in the brain, raising questions about how evidence-informed and coherent the mental models are that teachers use in making decisions about instruction.³

As education systems have sought to become more prescriptive around

what practices are best supported by evidence, there is a greater need to understand whether teachers possess the knowledge required to implement those practices effectively. It is difficult to evaluate teachers' classroom practices at scale via observations, and self-report of teachers' usage of practices is unreliable. On the other hand, measuring knowledge can tell us whether the knowledge required to successfully implement system-wide mandates (the explicit teaching mandate in New South Wales or the Victorian Teaching and Learning Model 2.0) is even present; or whether more needs to be done by systems to support teachers to develop their knowledge and practice beyond simply mandating a new model.

This paper extends previous work by seeking to answer more definitively what Australian teachers know about effective teaching by reporting the results of a 10-item survey conducted with a professionally recruited sample of Australian teachers (n=377). Results are reported by individual item and contextualised against previous studies where available. Further analysis involves examining whether teacher-level characteristics such as age, location, level of school taught and gender had unique relationships with the likelihood of identifying items correctly and the strength of consensus on items.

The overall findings are consistent with previous reviews suggesting that teachers often hold a mixture of evidence-aligned and evidence-misaligned beliefs about learning. In this sample, knowledge was low and uneven across concepts, with strong consensus on some items, widespread endorsement of misconceptions on others, and no clear shared evidence-aligned position on several instructional questions. This report is one of the few papers that aims to move beyond

neuromyths to attempt to gauge the knowledge we want teachers to have, and adds to the relatively small cluster of studies that do this specifically for Australian teachers. After presenting results and analysing the core findings, this report makes recommendations

for policymakers, schools and school systems to help equip all Australian teachers with the knowledge base required to make increasingly sophisticated instructional decisions.

Why measure teachers' beliefs and knowledge?

Teachers' mental models of how students learn are consequential

Teachers draw on 'mental models' of how learning occurs when making decisions about instruction, assessment and classroom practice:

All teachers, whether implicitly or explicitly, employ a theory of learning when they teach. By this we simply mean that teachers have a *set of beliefs and expectations about how their instructional decisions will foster learning with their students*. Those beliefs and expectations comprise a teacher's mental model — and we believe *that model should be informed by our best available scientific understanding of how we learn*. [emphasis added].⁴

These mental models can act as "filters for instruction"⁵. Like a filter, an evidence-informed mental model should enable useful ideas about teaching and learning to pass through into classroom decision-making, and enable what is not useful to be discarded.

While the relationship between 'beliefs' and instructional decisions is not always clear, teachers do not make instructional decisions in a vacuum. Their understanding of how students learn influences a range of decisions, from what approaches appear plausible, navigating competing claims around efficacy and evidence, and how that underlying framework informs student-facing decisions.

Cognitive scientist Daniel Willingham has advocated teaching simple 'modal

models' to teachers; simplified cognitive models that organise empirical findings without introducing risky, untested predictions. These models help teachers connect and remember key facts about learning without getting bogged down in academic debates.⁶

If teachers' existing knowledge shapes how they interpret evidence and make instructional decisions, then systems attempting to change practice need some way of knowing whether teachers possess the conceptual foundations those reforms assume. Measurement can therefore serve both a diagnostic purpose — identifying misconceptions, gaps and areas of weak consensus — and an implementation purpose, by showing whether teachers have the knowledge required to understand and sustain evidence-informed reform and where systems can support teachers to develop this further and meaningfully improve practice. KIP Part 1 developed the broader case for this relationship between knowledge, practice and reform.

Current evidence suggests there are important gaps in teachers' knowledge

But teachers, through no fault of their own, do not necessarily possess the bedrock knowledge required for the strong mental models that enable good instructional decision-making. Global evidence suggests they are prone to believing in 'neuromyths': false information about the brain and learning that is too often utilised to inform teaching practice. The belief

that students have a 'learning style' that means they learn better if taught in line with that 'style' is widely-held globally, including by clear majorities of Australian teachers.^{7 8} The belief that students can be left-brain or right-brain dominant is also very common globally, and held by around half of Australian teachers.⁹ How these neuromyths impact classroom practice is less clear, but teachers of younger students were more likely to select teaching approaches linked to unfounded ideas than teachers of older students.¹⁰ This should be seen as the educational policy ecosystem failing teachers, not as a failing of the teachers themselves.

While several surveys of teachers' belief in neuromyths have been performed using the items in the seminal Dekker et al. study in 2012,¹¹ less attention has been focused on knowledge of concepts drawn from cognitive psychology that have direct implications for teaching. Concepts that have been incorporated into at least one or two studies include the role of attention in learning, working and long-term memory, retention, recall and testing, inquiry or project-based learning and explicit teaching, and problem-solving and critical thinking. This literature was reviewed in KIP Part 1, showing results varied across topics.¹² In most cases, the strength of evidence behind a principle was not reflected in educators' responses, and views could be polarised even when the evidence points in a particular direction.¹³

Taken together, this suggests there is good reason to believe teachers' mental models on average may not align with evidence. However, there is still no clear picture of what Australian teachers know and believe about effective teaching more broadly.

Existing measurement tools are inadequate

Apart from a 2025 study of Spanish educators led by Juan Fernández and colleagues,¹⁴ research has more

commonly focused on teachers' endorsement of neuromyths or relied on self-reported classroom practice rather than directly assessing teachers' knowledge of learning and instruction.

More broadly, the evidence on teacher evaluation suggests that no single measure provides a complete picture of teaching quality. A 2014 Sutton Trust report examined the question "What kind of frameworks or tools could help us to capture great teaching" and identified classroom observations, value-added models and student ratings as having moderate validity, while principal judgements, teacher self-reports and classroom artefacts or portfolios had more limited validity. Classroom observations provide valuable evidence of instructional practice but are resource-intensive and difficult to implement consistently at scale. While value-added measures can be useful, they are unavailable or inappropriate in many subjects and require substantial longitudinal data. Teacher self-reports are comparatively inexpensive but are vulnerable to social desirability bias, inaccurate recall and differences in how teachers interpret instructional practices.¹⁵

These limitations are particularly relevant for education systems seeking to monitor the implementation of science of learning-informed reforms at scale. The Australian Professional Standards for Teachers (APST) are widely used for various purposes across the teacher life cycle, including initial teacher education programs, the Teaching Performance Assessment (TPA), required across ITE programs, and the accreditation practices used for in-service teachers across states and territories. But they are not fit for the purpose of system-wide monitoring. Not only are the standards themselves conceptually vague,¹⁶ the associated self-evaluation tool is too broad to assist systems with measuring and monitoring science of learning knowledge.

Therefore, we have a need for a tool that provides a practical means of monitoring whether teachers possess the knowledge and beliefs that underpins system-wide attempts at instructional change. Such a tool would directly gauge teachers'

knowledge about effective teaching and could be triangulated with classroom observations, student outcomes and other evidence to inform professional learning and implementation efforts.

About the survey approach

The first paper in the Knowledge is Power series also explained why certain ideas are classified as true and others as false. For a fuller picture of each concept, refer to *Knowledge is Power: What teachers believe about learning*.

To provide an interim indicator of Australian teachers' science of learning knowledge and assist in the research process for developing an appropriate tool for broader use, the CIS commissioned market research firm and member of The Australian Polling Council, Fox & Hedgehog, to run a sample of 10 items with a panel of professionally recruited teachers.

The survey was conducted between 24 June and 3 July 2026. The final sample comprised 377 respondents intended to be broadly representative of Australian teachers. Details of the demographics of respondents are included in Appendix A. The overall margin of error for the survey was approximately ± 5.0 percentage points, with larger margins of error for subgroups.

The 10 items were drawn from various sources, with most adopted and adapted from literature and some newly constructed. Further information about the nature and provenance of these items is included in Appendix B. Respondents provided answers in a standard five-point Likert scale, ranging from 'Strongly Disagree' to 'Strongly Agree'.

Given items are worded as 'true' or 'false', the colours in the charts below are coded to reflect the underlying alignment with evidence: green shades correspond with evidence-aligned (correct) answers, and orange shades

correspond with evidence misaligned (incorrect) answers. Overall results are shown in Table 1 and Appendix C.

Given the sample size, subgroup differences should be interpreted with caution. Item-level differences of 10 percentage points or more were noted descriptively, along with repeated patterns across related items. Where a broader difference was apparent in overall scores, this was tested separately. The research questions were as follows:

- 1. The overall knowledge pattern:** What do teachers appear to know or misunderstand? Are these results consistent with, or divergent from, earlier literature?
- 2. Differences between teacher types:** Are knowledge gaps concentrated among particular groups of teachers based on factors such as age, location, gender or school stage, or broadly distributed across the sample?
- 3. Strength of consensus:** How strong or divided are teachers' responses across different items?

The item-level discussion is grouped into three themes for reader convenience, with Likert scale responses presented alongside the verbatim item used with respondents. Negatively keyed items were reverse-coded, such that scores closer to 5 are strongly evidence-aligned and scores closer to 1 strongly misaligned to the evidence. This enables a consistent calculation of mean scores and standard deviations to align with evidence.

Results from the survey

Table 1 presents the headline results from the survey. Responses are coded as 'correct' and 'incorrect' to align with the evidence.

Table 1: Responses for all items, all respondents

Statement	Truth	Strongly correct	Correct	Neutral	Incorrect	Strongly incorrect
Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinaesthetic)	FALSE	1%	4%	7%	39%	49%
To learn how to do something, it is necessary to pay attention to it	TRUE	58%	38%	3%	1%	0%
Students can only learn if they have some previous interest	FALSE	4%	34%	31%	23%	8%
Problem solving is a skill which needs to be practised in context	TRUE	44%	48%	6%	2%	0%
Testing, in general, tends to detract from learning	FALSE	1%	27%	31%	29%	12%
Students learn better by discovering things on their own than through explicit instruction	FALSE	5%	25%	32%	26%	12%
There is still little evidence that project-based learning (PBL) in school education leads to more student learning	TRUE	12%	28%	36%	21%	3%
The typical human brain can only process a limited amount of information at once	TRUE	25%	49%	14%	11%	1%
Students learn very little from lecturing or reading, but learn a great deal from doing activities and teaching others	FALSE	2%	11%	22%	43%	22%
Whole-class teaching cannot be effective because every student learns differently	FALSE	6%	30%	25%	26%	13%

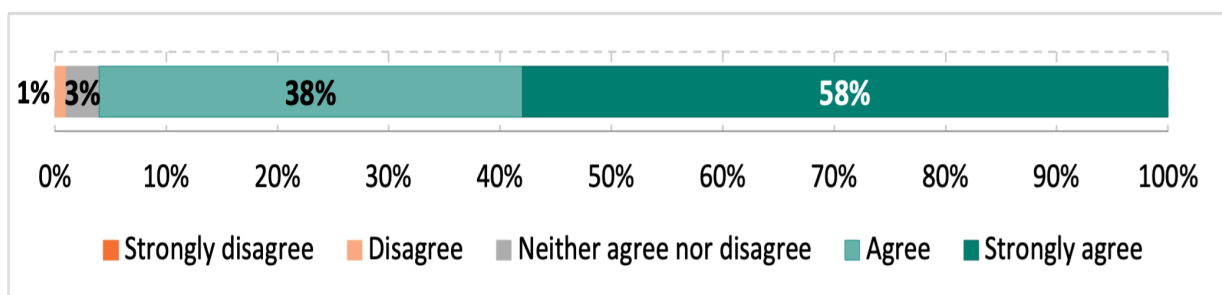
Learning and teaching grounded in human cognition

These items test whether teacher respondents are aware of the common features of human cognition and memory that apply broadly across people. These items are not placed within a school or education context — they do not ask about ‘students’ or ‘teaching’ specifically.

Attention and learning

Attention is a prerequisite for learning because new information must first be consciously processed before it can be encoded into long-term memory. Attention is one of the foundational concepts within the science of learning and one with direct implications for classroom instruction.¹⁷

Figure 1: “To learn how to do something, it is necessary to pay attention to it” — all respondents



Almost every respondent (96%) agreed that attention was a necessary precondition for learning. Teachers showed strong agreement with the evidence that students need to pay attention to learn ($M = 4.54$, $SD = 0.59$), with little variation in responses.

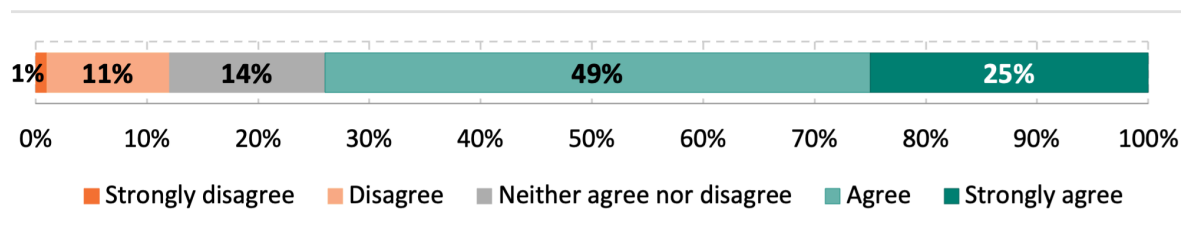
While this might seem a statement of the obvious, an identical statement has been tested in other literature where agreement has been much lower; small sample studies with US and UK teachers yielded agreement between 40% and 50%.¹⁸ This statement was first tested with members of the general public in Brazil, where 73% agreed. The strong levels of agreement overall are also consistent between different groups; respondents tended to answer this question in the same way.

This is a positive result as it suggests teachers are aware of the importance of gaining and maintaining attention and may be receptive to teaching strategies that can be shown to enable focus and attention. However, it does not show that teachers necessarily already know what those strategies are, as many approaches can claim to ‘engage’ students without meaning students’ attention is on the right things.

Working memory

Working memory is limited in its capacity (4-7 unique items) and duration (20-30 seconds). These capacity constraints underpin instructional approaches that seek to optimise cognitive load during initial learning.¹⁹

Figure 2: “The typical human brain can only process a limited amount of information at once” — all respondents



74% of respondents agree overall with the idea that the brain has limitations in terms of active processing, with 12% disagreeing and 14% neutral. Teachers generally answered in line with the evidence on working memory limits ($M = 3.87$, $SD = 0.94$), though responses were less settled than for attention.

Because this item was newly constructed for this survey, there is no other literature with which to compare directly. One survey of 87 learning support and special education teachers in Australia saw 86% agreement with the statement “students with ADHD are likely to experience constraints in the capacity and functioning of working memory”.²⁰

Table 2: “The typical human brain can only process a limited amount of information at once” responses by age and location

Teacher group	% correct
All	74
Age: 18-34 years	80
Age: 35-44 years	75
Age: 45-54 years	72
Age: 55+ years	69
Location: NSW	73
Location: Victoria	80
Location: Queensland	73
Location: Rest of Australia	68

Different groups of teachers sometimes answered this question in different ways (Table 2). While there were no observable differences based on gender or teacher type (primary or secondary), there was a consistent

age gradient: 80% of teachers aged 18-34 affirmed that the brain has limitations on processing information compared to just 69% of those aged 55+. Observable differences were also present for location, with 80% of teachers in Victoria responding correctly compared to 68% of those in the rest of Australia.

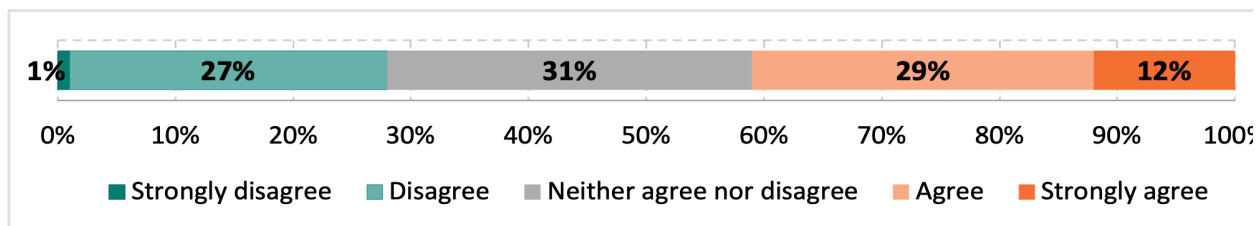
This item represents a very basic conception of working memory, which was deemed the best threshold question for teachers to answer for the purpose of this research. Additional research could probe teachers’ knowledge of the exact scope (capacity and duration) of working memory limitations, as well as the intersection with long-term memory, to gain deeper understanding of how well teachers are prepared for working within these limitations in the classroom.

Testing effect

Testing, when used as a frequent low-stakes instructional strategy, strengthens the retention and retrieval of newly learned information. The so-called ‘testing effect’ is one of the best-substantiated findings in cognitive science.²¹

Despite the weight of evidence supporting the importance of testing to retention and retrieval, the majority of teachers did not respond in an evidence-aligned way. Only 28% expressed a view allowing that testing might be good for learning, whereas 4 in 10 respondents answered incorrectly. Roughly another third did not take a clear position.

Figure 3: “Testing, in general, tends to detract from learning” — all respondents



Teachers’ responses leaned slightly away from the evidence on whether testing detracts from learning ($M = 2.79$, $SD = 1.02$), with considerable variation in views. It is possible that the low result is attributable to an assumption by respondents that ‘testing’ referred to high stakes or summative testing rather than low-stakes retrieval practice.

The result from this sample is well below a 2019 study of higher education instructors, from which this item is taken verbatim; 54% were able to recognise the statement is incorrect and it increased to 72% when an additional question was framed as “frequent, low-stakes tests do not enhance learning”.²² While the result in this sample is concerning when compared to the original literature from which the item was drawn, further research could present additional items, with different framing, to more reliably gauge perspectives. If teachers eschewed effective instructional strategies that draw on the testing effect, such as spaced and retrieval practice, because they mistakenly believe that testing detracts from learning, then this would have negative consequences for their practice.

This item was the most likely to see differences between groups within the sample. Table 3 reports the proportion of teachers getting the answer correct (by answering ‘strongly disagree’ or ‘disagree’) by subgroups, with observable differences shaded.

Table 3: “Testing, in general, tends to detract from learning” responses by teacher subgroup

Teacher group	% correct
All	28
Gender: Male	37
Gender: Female	26
Age: 18-34 years	23
Age: 35-44 years	28
Age: 45-54 years	30
Age: 55+ years	36
Location: NSW	32
Location: Victoria	31
Location: Queensland	20
Location: Rest of Australia	30

According to Table 3, male teachers were more likely than female teachers to get this item correct; 37% of men compared to 26% of women. This is the only item of the 10 where a gender gap exceeds 10 points.

There is also another age-related gradient: younger teachers were much less likely to identify testing as useful for learning (23%) compared to older teachers, especially those aged 55 and over (36%), with whom there is a 13-percentage point gap.

Geographical variation is also evident. Queensland teachers were between 10 and 12 percentage points less likely to identify testing as useful for learning than teachers in the other parts of Australia.

Learning and teaching individualised

These items are aimed at testing whether teachers hold views that suggest individual learners have substantive differences in preferences, interests or characteristics and these differences can inform the circumstances in which they best learn.

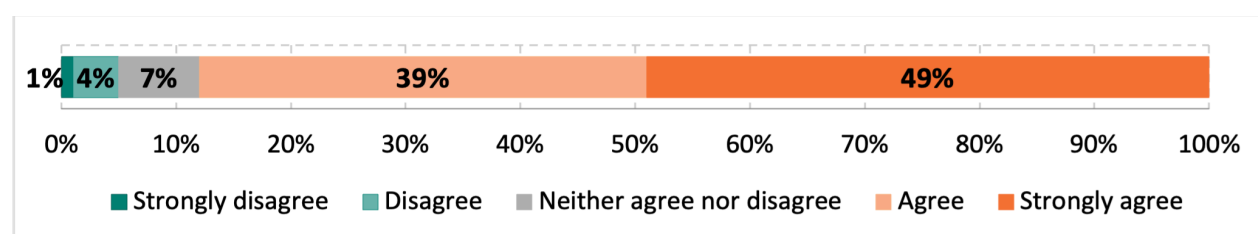
Learning styles

The learning styles hypothesis proposes

that students learn more effectively when instruction is matched to a preferred modality, such as visual, auditory or kinaesthetic.²³ Learners may have preferences for how information is presented, but learning styles do not meet the criteria required of a valid theory of learning.

Experimental evidence also does not show that matching instruction to a preferred learning style improves learning outcomes.²⁴

Figure 4: Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinaesthetic) — all respondents



Overall, 88% of respondents incorrectly believe students learn better if taught according to a preferred learning style. Furthermore, this response is driven by strong levels of agreement. Half of respondents 'strongly agree' with the learning styles statement; the largest such response for a false statement within the whole dataset. With a mean of 1.68 and a relatively low standard deviation of 0.82, teachers' responses were strongly on the wrong side of the evidence and fairly concentrated rather than widely split.

This result is notably higher than the most recent Australian studies — Carter et al (2020) of pre-service teachers had 77.4% agreeing²⁵ with the statement and Hughes et al (2020) of practising teachers had 79% agreeing.²⁶ Kim and Sankey (2017) of pre-service teachers saw 97.1% agreement.²⁷ Overall, the result of 88% is in line with a 2020 meta-analysis of 33 studies (across 18 countries and around 15,000 participants) that showed 89% agreement.²⁸ Learning styles was one

of the common neuromyths included by the Strong Beginnings report as an example of what core content for the Brain and Learning domain should include to ensure future teachers do not persist in this view.

Previous literature suggests teacher age and career stage do not have any meaningful bearing on how likely a teacher is to believe this incorrect proposition. In this survey, there is no observable pattern in responses between various subgroups of teachers. This is concerning, because learning styles' status as a myth is quite well-established, yet it does not appear to have become less believed by newer generations of teachers.

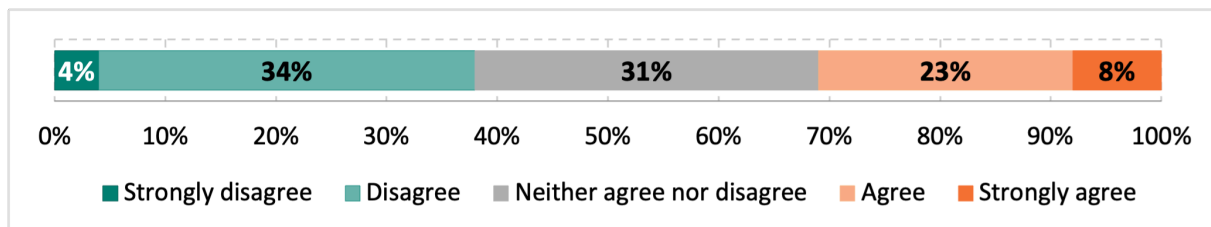
Student interest

Student interest may influence engagement, but learning does not depend on students already being interested in a topic. Instead, existing knowledge shapes how new information is interpreted and incorporated into long-term memory. Recognising

the importance of prior knowledge therefore supports teaching knowledge well, rather than personalising teaching around students' existing interests or experiences.²⁹ If teachers do believe engaging students' 'previous interest' is

necessary for learning, this could make approaches favouring student choice and personalised, student-directed learning more appealing, though these approaches lack evidence that they are effective.

Figure 5: "Students can only learn if they have some previous interest" — all respondents



There is a great deal of variation in responses to this question, with responses almost evenly split between the 'agree' and neutral categories. Around four in 10 (38%) correctly disagreed with the statement as provided. Teachers were split on whether students can only learn what they are already interested in ($M = 3.04$, $SD = 1.02$), suggesting no clear shared view. No subgroup differences exceeded 10 percentage points.

The study of Spanish teachers from which this question was drawn reported its results in terms of mean scores and standard deviation from a six-point scale, forcing respondents to choose between a (broad) 'disagree' or (broad) 'agree' position, unlike the one used in this survey which permitted a neutral option. This makes a direct comparison difficult, but 68% of the Spanish sample overall expressed disagreement with the statement and a mean score of 2.76³⁰ — suggesting the sample of Spanish educators was more accurate than this survey of Australian teachers.

Learning pyramid

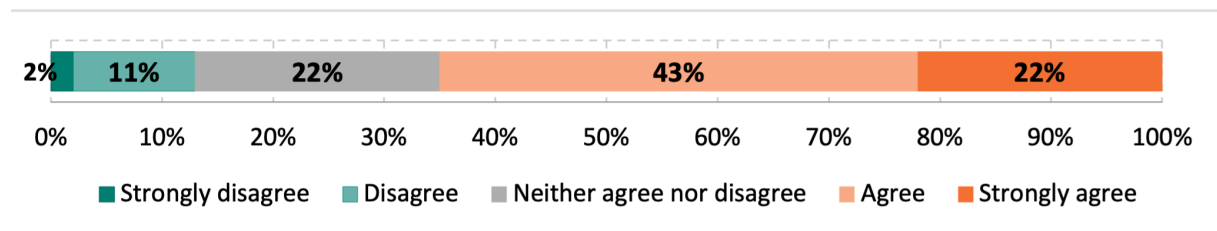
The 'learning pyramid' or 'cone of experience' ranks certain learning activities by percentages with higher percentages — associated with 'practice doing' and 'teach others' — supposedly linked to better student retention,

with lecture and reading given low percentages and therefore less likely to aid retention.³¹ While some activities are better for learning than others, so much is context-dependent that the theory does not provide an evidence-based approach to teaching.³²

This item was newly constructed for this survey on the basis of sector consultation. It represents an attempt to detect whether respondents believe a 'learning pyramid' misconception: students need to be 'active' to be learning and that if they appear 'passive' (as they might be if listening or reading) then they are not learning.

Because this item is newly constructed, comparison with other literature is not possible. These results show a two-thirds majority of teachers believe the statement is true, with 22% expressing strong agreement. Only 12% disagreed with the statement. With a mean score of 2.26, teachers' responses were clearly on the wrong side of evidence, though the magnitude of this was lower than for learning styles.

Figure 6: “Students learn very little from lecturing or reading, but learn a great deal from doing activities and teaching others” — all respondents



This suggests when teachers are considering what tasks to set as part of learning, they may be more likely to pick ‘activities’ where students look busy or learn via teaching and interacting with their peers. Conversely, activities where students are thinking hard but may predominantly be listening, reading and responding to questioning may lack appeal to teachers who hold the misconception.

Given the low levels of correct responses, subgroup analysis should be interpreted with great caution. However, as there was for the testing item (Table 3), there is an age-related gradient visible in Table 4: teachers 55+ were twice as likely as younger teachers (18-34 years) to correctly reject the ‘learning pyramid’ idea.

Table 4: “Students learn very little from lecturing or reading, but learn a great deal from doing activities and teaching others” responses by teacher subgroup

Teacher group	% correct
All	12
Age: 18-34 years	9
Age: 35-44 years	11
Age: 45-54 years	12
Age: 55+ years	19

Applying knowledge of learning to instructional choices

These items test whether teachers apply their underlying beliefs and knowledge about learning to questions

of what effective teaching approaches look like in the classroom.

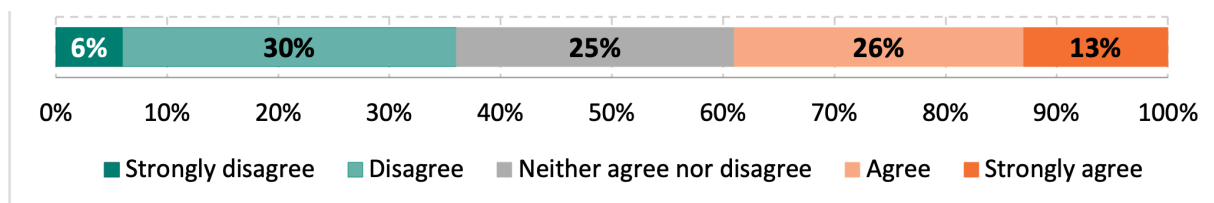
Whole-class teaching

This item is newly constructed and is an instructional application of the learning styles hypothesis, testing whether a belief in every student learning differently should inform decisions about whether to use whole-class teaching approaches.

As a newly constructed item, there is no literature for comparison. But these results show only 36% of teachers disagree with the statement and believe whole-class teaching can be effective. One quarter of teachers selected the neutral midpoint, and four in 10 agreed. Teachers were strongly divided on this item ($M = 2.91$, $SD = 1.14$), with the widest spread of responses across all items. No subgroup differences exceeded 10 percentage points.

While this item suggests that teachers’ strong belief in learning styles in this sample does not necessarily amount to a belief that student learning is so different that “whole-class teaching cannot be effective”, it is concerning that only 36% of teachers gave a response in alignment with the evidence. This newly constructed item was deliberately phrased to be clear (‘cannot’ rather than ‘may not’) and such a low correct response — with a quarter of teachers neutral — suggests a significant minority of teachers may

Figure 7: “Whole-class teaching cannot be effective because every student learns differently” — all respondents



be more inclined towards group based, differentiated, or student-selected tasks rather than whole-class teaching.

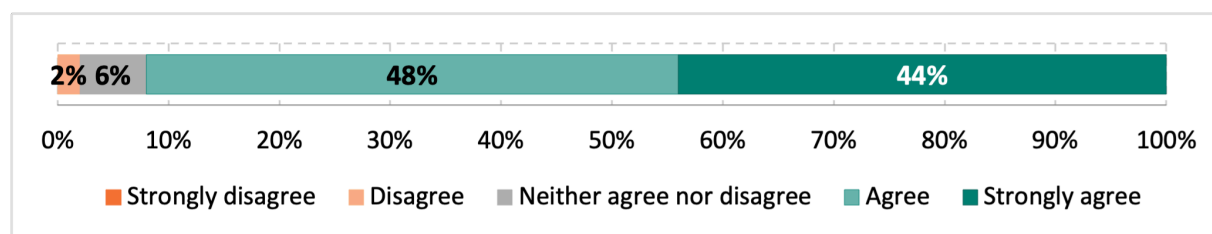
Problem solving

Effective problem-solving depends on the knowledge already stored in long-term memory and, like critical thinking,

it does not represent a generic, transferable skill that can be taught or applied outside a domain knowledge context.

Consequently, developing students' knowledge within domains is the prerequisite for successful problem-solving and critical thinking.³³

Figure 8: “Problem solving is a skill which needs to be practised in context” — all respondents



Overall, 93% of respondents agreed with this statement. The mean level of agreement ($M = 4.35$, $SD = 0.67$) was the second-highest in the whole dataset (with the attention item the highest mean score) with responses relatively concentrated.

This item was replicated from a study of Spanish teachers. In that study, 77% of teachers agreed with the statement — a much lower proportion than this study. There were no observable differences between groups of teachers for this item. While this may look positive for Australian teachers, caution is needed when interpreting the results, as the item is worded broadly. For instance, one interpretation of the statement would be that problem solving should be practised in realistic or real-world context, which would not necessarily capture the cognitive science insight about domain specificity. Further iterations of a survey could run this item with a similar item that uses a

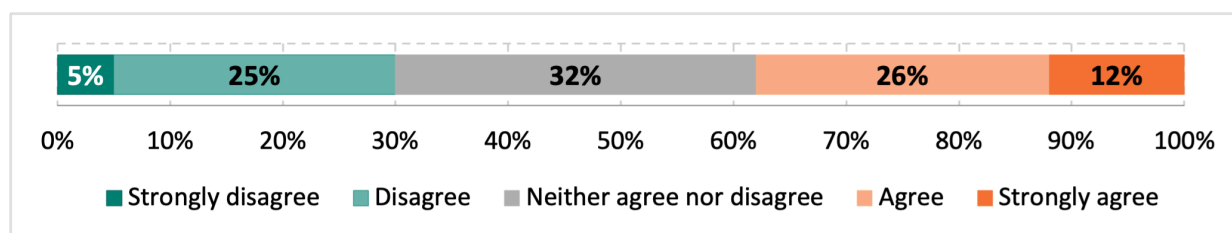
more direct capture of the domain specificity concept to gain deeper insight.

Discovery learning and project-based learning

One of the principal instructional implications of research on attention, memory and cognitive load is that new material should generally be introduced through explicit teaching rather than minimally guided approaches, such as students discovering things on their own and project-based learning.

This crucial idea was tested with two different items, one framed positively (Figure 9) and one framed negatively (Figure 10). The item in Figure 10 is phrased somewhat differently from other items because it asks respondents what they think of the evidence base, enabling us to see whether both items point in the same or direction or there are differences.

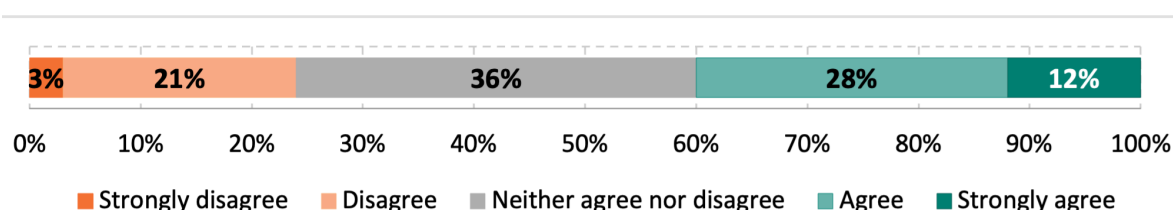
Figure 9: “Students learn better by discovering things on their own than through explicit instruction” — all respondents



Only 30% of respondents overall were correct (‘strongly disagree’ or ‘disagree’) that students do not learn better by discovering things on their own when compared to explicit instruction. A third of respondents were neutral, and 38% — almost 4 in 10 — affirmed the statement.

This item was drawn from the Fernández et al study of Spanish teachers. That study used a different answer format to this survey and responses are not directly comparable — see discussion above for Figure 5 for additional information.

Figure 10: “There is still little evidence that project-based learning (PBL) in school education leads to more student learning” — all respondents



Only 40% of respondents from this sample overall correctly identified the lack of evidence supporting PBL in school education, but this is not meaningfully different from the 36% who did not take a clear position.

It is possible the neutral option may reflect a genuinely held view that the evidence is mixed. One in four respondents were incorrect.

This is interesting as in some respects this item tests a similar concept to the previous item (Figure 9) about discovery learning. For that item, only 30% were correct in saying that students do not learn better through discovery than through explicit instruction. But for this, a higher proportion of respondents were able to identify that the evidence base for project-based learning — another variation on minimally-guided instruction — is lacking.

This item, like the previous one, is slightly modified from the Fernández et al study of Spanish teachers. Under those conditions, 35% of their sample answered the question in alignment with the evidence. This suggests a broad similarity between Australian and Spanish teachers on this matter.

Due to the conceptual similarity underlying the items, Table 5 combines the subgroup analysis by location. Location was the only subgroup where variation was evident. For both items, the proportion of correct responses in Queensland was the lowest, 10 to 12 points below the overall result. While this gap is only slightly larger than the margin of error in these smaller samples, it means there are three items (portrayed in Table 3 and Table 5) where Queensland respondents are less likely to be correct.

Table 5: Explicit instruction and project-based learning, by location

Teacher group	“Students learn better by discovering things on their own than through explicit instruction” % correct	“There is still little evidence that project-based learning in school education leads to more student learning” % correct
All	30	40
NSW	31	47
Victoria	32	44
Queensland	18	30
Rest of Australia	37	36

Implications of the results

Finding 1: Teachers’ overall knowledge of science of learning-related ideas was low, and highly uneven by concept

The 10 item selection put to our sample of 377 Australian teachers included some foundational propositions about the science of learning and instruction. Despite this, the overall mean correct score was 4.53, and only 16 respondents (4.2% of the sample) answered eight or more questions correctly. This suggests gaps in familiarity with these concepts were widespread across the respondents in this sample.

Three items attracted high levels of consensus: teachers were aligned with the evidence on attention and problem solving but the opposite was true for learning styles, where the 88% that affirmed learning styles did so contrary to the evidence.

The learning styles myth receives a significant amount of attention within literature, attracting multiple individual studies and a meta-analysis. What makes this question relevant is that it tests the idea of cognitive similarity versus dissimilarity: if teachers believe that there is something about how individual students learn that is substantially different from one student to another — with the implication that students might suffer if not taught in line with their ‘learning style’ —

this can act as a bedrock belief that underpins a range of instructional decisions that poorly align with evidence.

It is positive that 96% of respondents affirmed the importance of attention (an example of cognitive similarity) for learning, and did so at a much higher level than other samples. But held together, these beliefs could reflect an internally inconsistent understanding of how learning happens: one recognises common cognitive constraints, while the other assumes substantial learner-specific differences in how information is best received and learned. An alternative interpretation is that respondents do not see these as contradictory — potentially instruction being designed to suit individual learners’ preferences may assist those learners in maintaining the attention that is key to learning. Additional questions on these themes could clarify how teachers understand the relationship between attention, individual differences and instructional choice.

On the other hand, items with more direct relevance for instructional decisions saw substantial variation, neutral responses, and inaccuracy. Around a third of teachers did not take a clear position on four items, with the largest such response (36% of teachers) doing so for what the

evidence says about project-based learning in school education. 32% of teachers were neutral about whether discovery learning was superior to explicit instruction with 30% (correctly) disagreeing. Testing was another notable item: only 29% of teachers correctly rejected the claim that testing detracts from learning, while 31% were neutral and 40% answered contrary to the evidence. While this was grouped with items assessing a cognitive understanding of learning, it is also one that has obvious instructional implications.

The highest standard deviation (1.14) was for the item about whole-class teaching, where teachers' responses were the most spread out. When combined with the high proportion of teachers not taking a clear position on project-based learning, whether discovery learning was superior to explicit instruction and whether students can only learn if there is some previous interest, this suggests teachers have a wide range of views about instructional choices and for many teachers those views are misaligned with evidence.

Finding 2: Teachers' knowledge gaps were broadly distributed across the profession, with evidence of lower scores from Queensland teachers.

Appendix D shows the distribution of correct answers by the four subgroups of teacher type, gender, age and location. While there are some small differences between groups in mean correct scores — males appear to outperform females, teachers 55+ appear to outperform teachers aged 18-34 and secondary school teachers appear to outperform primary school teachers — subsequent checks confirmed these are not statistically significant differences, and should not be treated as reliable subgroup differences.

One exception was Queensland.

Queensland respondents had a lower mean correct score than respondents in the three other location groups combined: 4.20 compared with 4.61 out of 10. As this was the only location group that appeared different, the Queensland/non-Queensland difference was tested directly. Although the difference is statistically significant,³⁴ it is small in absolute terms (0.4 of an item) and should be interpreted cautiously, given the subgroup sample size.

Some differences between Queensland and other responses were also evident in three items with direct implications for instruction. Queensland respondents were less likely to answer in an evidence-aligned way on the impact of testing on learning (20% correct), discovery learning (18% correct) and project-based learning (30% correct).

The non-Queensland sample is dominated by teachers from Victoria and New South Wales, both of which have mandates in place relating to explicit teaching and the science of learning in government schools. While it is difficult to draw firm conclusions given a system mandate does not necessarily reflect instructional reality at the teacher level, it is possible that there is greater awareness of some of these concepts — particularly privileging explicit approaches over student-led approaches — among teachers from those states because of the system-driven work that has occurred so far.

In contrast, Queensland does not have any such mandate or instructional model in place for its government schools. When combined with the lower mean total score, the repeated pattern warrants further investigation in more detailed research.

Age-related findings are discussed subsequently in Finding 3, but the other differences are meaningful

because teachers ended up with broadly similar overall science of learning knowledge, despite some item-level variation. This supports the hypothesis that there is a general concern with teachers' professional knowledge of the science of learning, and gaps are not concentrated in any one group of teachers (with the aforementioned exception of Queensland).

Finding 3: Teachers' science of learning knowledge does not appear to grow with age and experience

Tables 2 to 4 highlighted age-related gradients in three items: working memory (favouring younger teachers), and testing and the learning pyramid (favouring older teachers). On the one hand, younger teachers' familiarity with the concept of limitations to working memory could reflect some penetration of science of learning-related ideas, or it could reflect increasing emphasis on neurodiversity (particularly ADHD) and special learning needs among students where working memory and attention deficits can be a critical part of the instructional toolkit.

The opposite pattern for testing and the learning pyramid may likewise reflect cohort effects in professional ideas rather than an accumulation of knowledge through experience. Older teachers were more likely to reject both the claim that testing detracts from learning (36% correct) and the proposition that students learn little from lecturing or reading compared with more active methods (19% correct).

Given that these figures are still low in an absolute sense, the pattern does not clearly support a simple accumulation-of-knowledge explanation and may also reflect changes in the prevailing ideas among the profession; teachers may be more likely to endorse ideas that were prominent or regarded as normal practice during their own educational

experiences, whether as students or teachers.

In any case, it is difficult to attribute these generational differences to some substantive difference in exposure to certain ideas or lack thereof. We do not see younger teachers, with more exposure to science of learning-related ideas through reforms to ITE or system mandates perform meaningfully differently from older teachers whose training may not have been consciously aligned to the 'science of learning'. More importantly for policymakers and practitioners, the data does not support the idea that teachers will organically develop the professional bedrock knowledge required simply by being in the classroom without more conscious attempts to clarify and support teachers with what they need to know and be able to do in order to be successful in the classroom.

Conclusion and recommendations

Taken together, the findings point to a deeper problem than isolated misconceptions: Australian teachers do not appear to share a coherent and consistently evidence-aligned body of professional knowledge about how learning occurs and how that knowledge should inform instruction.

Moreover, there are no consistent patterns across different groups of teachers, depending on age/stage taught, teacher age/experience, gender or location (except for the somewhat lower overall accuracy of answers among Queensland respondents). Nor do the visible differences cohere with some explicable misconceptions. These findings align with the working hypothesis developed from KIP Part 1, which is that in the absence of clearly defined and inculcated professional knowledge, teachers' knowledge would be uneven and highly variable rather than systematically evidence-aligned.

The fact that the Strong Beginnings report in 2023 said that new 'core content' requirements for future degrees had to include material aligned with the ideas put to teachers in this report is evidence that initial teacher education has thus far failed to inculcate even some foundational level of teacher professional knowledge.

But the findings of this report go some way to confirm the thesis of earlier CIS work in this project that the problem goes deeper than simply initial teacher education. The existing professional lifecycle — including induction, accreditation, registration and ongoing professional learning — has not equipped teachers with bedrock knowledge of the science of learning with which they might make better informed instructional decisions.

If science of learning-informed practice is to become the foundation for a new teacher professionalism, greater

alignment is needed between that knowledge base and the specific policy architecture affecting the teacher life cycle.

Recommendations for federal, state and territory policymakers

The low overall accuracy of teacher responses by age and career group shown in this report gives little reason to believe the knowledge that teachers need to make increasingly sophisticated instructional decisions simply emerges through professional experience. The end result of the below proposals should be to create a consistent, connected knowledge base across the teacher career pathway, moving from initial teacher education, to graduate accreditation, to proficient accreditation and ongoing registration maintenance. In the absence of such a throughline, current accreditation and registration practices amount to merely a compliance exercise for teachers and school leaders alike.³⁵

1. Strengthen initial teacher education by ensuring the Strong Beginnings core content recommendations are implemented and assessed.

Federal authorities should take steps to closely scrutinise not only whether core content is met to a bare minimum standard but that it forms the backbone of initial teacher education courses, with de-accreditation a realistic option for providers that fail to meet the standard. It should also consider reforms to processes that would allow a broader range of non-university providers to deliver accredited initial teacher education qualifications, informed by England's more pluralistic model of teacher training provision.³⁶

2. Reform the Australian Professional Standards for

Teachers to more closely resemble England's Early Career Framework. If nine in 10 Australian teachers can overwhelmingly endorse the neuromyth learning styles while being lukewarm on testing, then a standard like 'how students learn' is not doing enough to define a shared body of professional knowledge that is usable both to initial teacher education providers and in-service teachers. The English model which states clearly that teachers "Learn that..." and "Learn how to..." — connecting knowledge-based propositions like those explored in this survey with specific classroom actions — should be the model for the next revision.³⁷

- 3. Move away from portfolio-based and towards knowledge-based processes to certify teachers at different career stages.** This would involve changes to the Teaching Performance Assessment (TPA), currently a necessary component for final year ITE students. However, portfolios are among the less reliable forms of capturing great teaching, both according to literature and the experience of our Initial Teacher Education Quality Assurance and Oversight Board. This group found "there is not a consistent standard of classroom readiness to determine whether students pass or fail the TPA".³⁸ Any move would also necessitate change to various state and territory-based teacher registration authorities which use portfolio-based assessments to move teachers from Graduate to Proficient status. Using knowledge of the science of learning as the basis for a certification exam — present in other school systems but absent in Australia — could be a more direct and efficient option for accreditation, and is worth investigating further.

Recommendations for schools and school systems

The findings from this sample also have implications for schools and systems which have more direct influence over teachers' professional development, and the ability to drive grassroots-led changes to what is meant by 'teacher professionalism'.

- 1. Build coherent mental models that bridge theory and practice for teachers, rather than isolated techniques.** These results show that teachers can be simultaneously quite certain about the importance of attention and that working memory has limitations, but unlikely to reject teaching approaches that make maintaining attention difficult and risk overloading working memory. Schools and school leaders should consider carefully whether they have struck the right balance between ensuring teachers have the generalisable knowledge base to make better instructional decisions, and also ensuring they have practical go-to techniques and resources.
- 2. Use knowledge-based formative assessments to help inform teacher professional development approaches.** The short list of questions in this set can form the basis of a larger survey deployed by schools and systems that enable them to understand the gaps in teachers' knowledge of the science of learning. When combined with other approaches, such as structured classroom observation tools and instructional scenario-based reflections, such knowledge-based assessments can be used to better understand teachers' needs for professional development and what makes sense in terms of next steps for a school or system.

Appendices

Appendix A: Sample details

The total number of teachers in this sample was 377, with a topline margin of error of 5%. Demographic data collected was teacher type, age, location and gender.

- The proportions of primary and secondary school teachers are roughly in line with their representation in the overall teacher workforce.
 - o For subgroup analysis, only 'primary school teacher' and 'secondary school teacher' were included, and there were no observable differences between these groups.
- The smaller categories (F-12 teachers and principals) were included in the overall count but not in this analysis.
- The age distribution of respondents broadly reflected the age profile of the Australian teacher workforce.
- The sample is female-dominated and the gender balance reflects the teaching profession in Australia
- For location, respondents from Victoria were overrepresented and those from New South Wales underrepresented.

Teacher Type	Counts	% of Total
Primary & Secondary	14	3.7
Primary school teacher	185	49.1
School principal	8	2.1
Secondary school teacher	170	45.1

Age	Counts	% of Total
18-34 years	99	26.3%
35-44 years	109	28.9%
45-54 years	89	23.6%
55+ years	80	21.2%

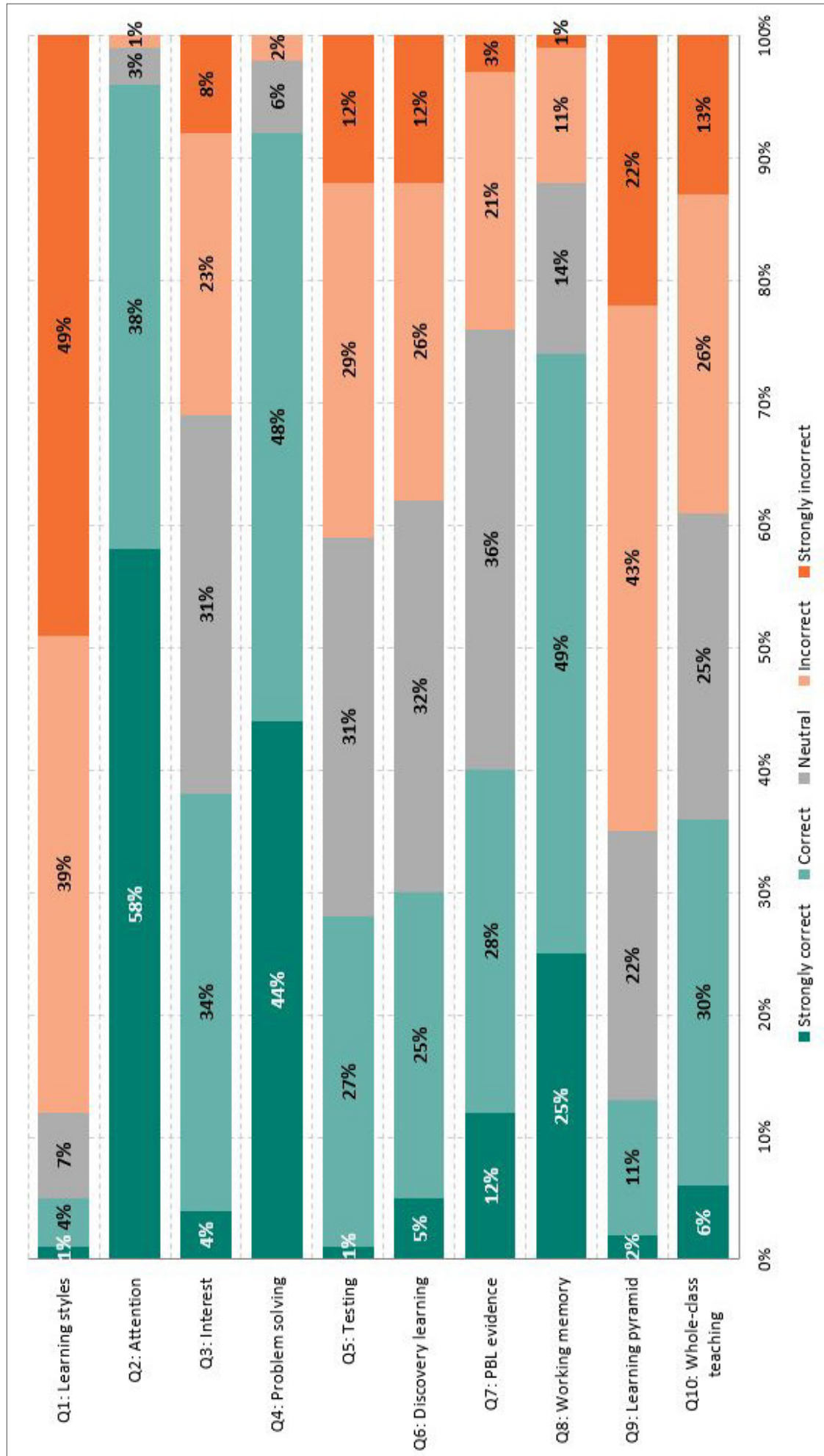
Gender	Counts	% of Total
Female	273	72.4%
Male	104	27.6%

Location	Counts	% of Total
Victoria	124	32.9%
NSW	98	26.0%
Queensland	74	19.6%
Rest of Australia	81	21.5%

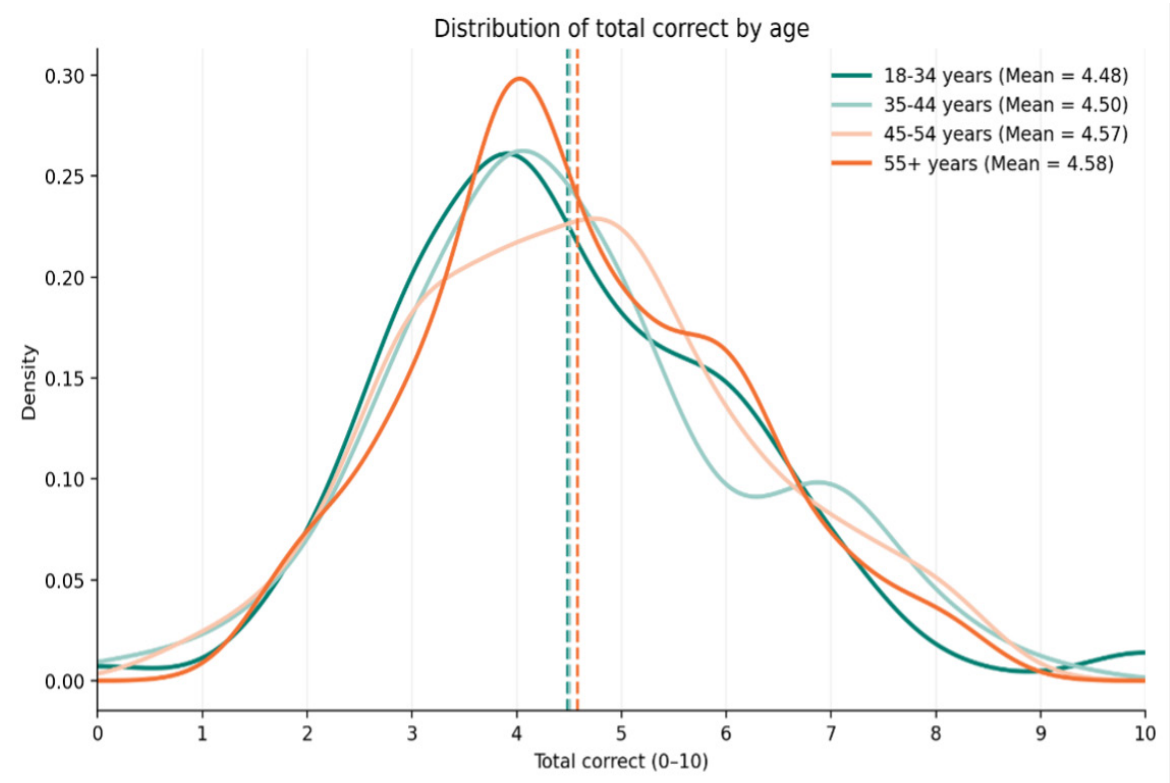
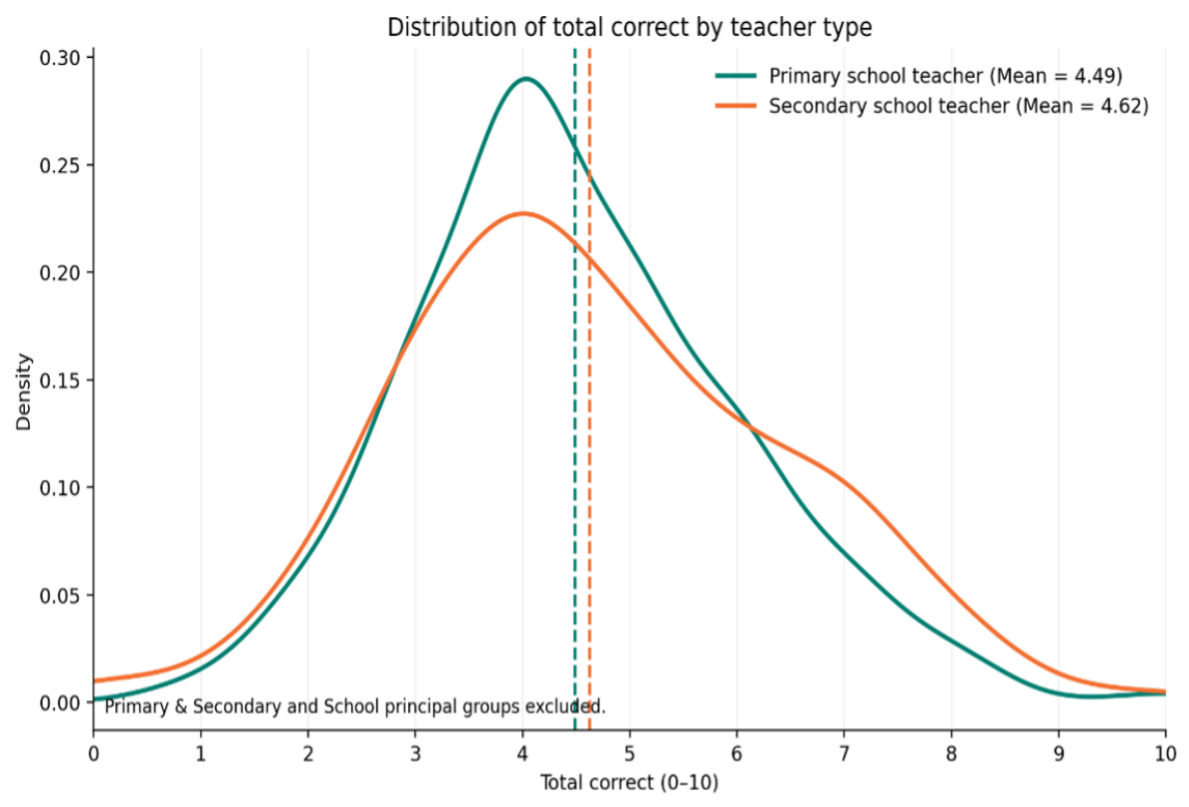
Appendix B: Full item list

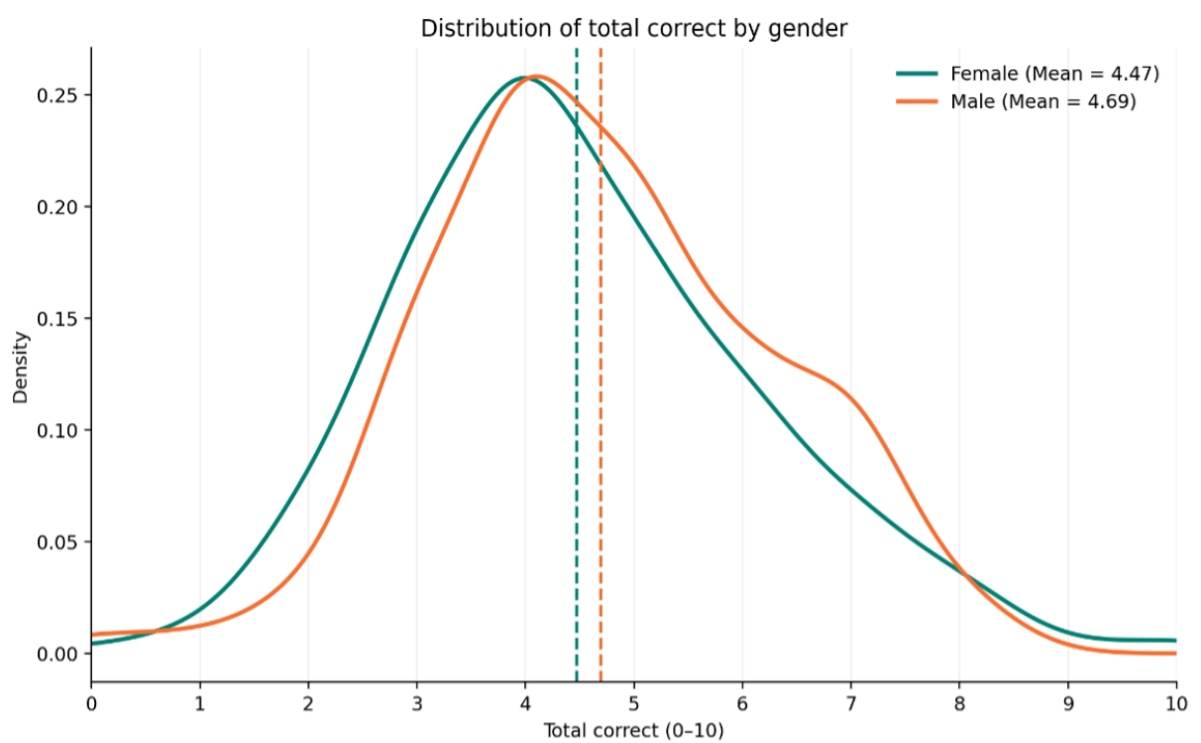
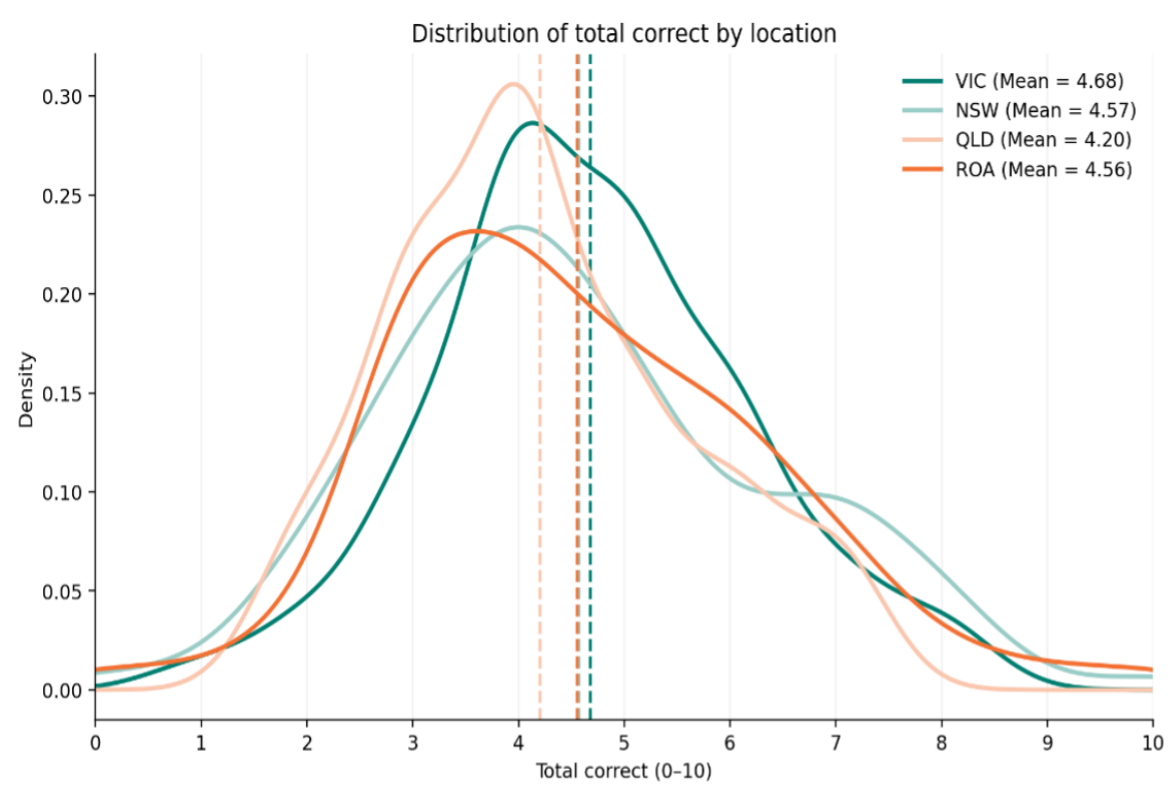
Item	True or false	Origin
Individuals learn better when they receive information in their preferred learning style (e.g., auditory, visual, kinaesthetic)	FALSE	A learning styles item was first used in Howard-Jones et al. 2009, with this verbatim form first tested in Dekker et al. 2012 and reused in this study.
To learn how to do something, it is necessary to pay attention to it	TRUE	First used in Herculano-Houzel 2002 with the general public in Brazil, with the first educator-focused study Howard-Jones et al. 2009. Used verbatim for this study.
Students can only learn if they have some previous interest	FALSE	Only used in Fernández et al 2025 of teachers in Spain.
Problem solving is a skill which needs to be practiced in context	TRUE	Only used in Fernández et al 2025 of teachers in Spain.
Testing, in general, tends to detract from learning	FALSE	First used in the Betts et al. 2019 study of higher education instructors.
Students learn better by discovering things on their own than through explicit instruction	FALSE	Originally “direct” instruction in Fernández et al. 2025. This was changed to “explicit” to make it more appropriate to Australia.
There is still little evidence that project-based learning (PBL) in school education leads to more student learning	TRUE	Originally “There is still little evidence supporting the use of project-based learning (PBL) in basic education” in Fernández et al. “Basic education” was altered to “school” to make it more appropriate to Australia, and the qualifier “leads to more student learning”.
The typical human brain can only process a limited amount of information at once	TRUE	Newly constructed as a basic representation of working memory limitations
Students learn very little from lecturing or reading, but learn a great deal from doing activities and teaching others	FALSE	Newly constructed as an expression of the active vs passive learning or ‘learning pyramid’ idea.
Whole-class teaching cannot be effective because every student learns differently	FALSE	Newly constructed as a test to check alignment with belief in cognitive similarity.

Appendix C: All items results — all respondents (0% not shown)



Appendix D: Distributions of total items correct by group





Endnotes

- 1 Jha, T. [*What Is the Science of Learning?*](#), Analysis Paper 63 (Sydney: Centre for Independent Studies, February 2024).
- 2 Jha, T. [*Implementing the Science of Learning: Teacher Experiences*](#), Research Report 47 (Sydney: Centre for Independent Studies, February 2024).
- 3 Jha, T. [*Knowledge is Power: What do teachers believe about learning?*](#), Analysis Paper 92 (Sydney: Centre for Independent Studies, October 2025).
- 4 Deans for Impact. (n.d.). *Learning by scientific design: Early insights from a network transforming teacher preparation*. <https://www.deansforimpact.org/files/assets/deansforimpactlbsdreportfinal-1.pdf>
- 5 Deans, C. and Larsen, E. (2022). Brain-based Learning: Beliefs and Practice in one Australian Primary School Implementing a Neuroscience Pedagogical Framework. *Australian Journal of Teacher Education*, 47:10, pp. 18-38. <http://dx.doi.org/10.14221/ajte.2022v47n10.2>
- 6 Willingham, D. T. (2017). "A mental model of the learner: Teaching the basic science of educational psychology to future teachers." *Mind, Brain, and Education*, 11(4), 166-175.
- 7 Newton, P. M. and Salvi, A. (2020) How Common Is Belief in the Learning Styles Neuromyth, and Does It Matter? A Pragmatic Systematic Review. *Frontiers in Education* 5:602451. Available from: <https://doi.org/10.3389/feduc.2020.602451>
- 8 Hughes, B, Sullivan, K. A., and Gilmore, L (2020), Why do teachers believe educational neuromyths? *Trends in Neuroscience and Education*, Vol. 21, 100145. Available from: <https://doi.org/10.1016/j.tine.2020.100145>
- 9 Hughes et al. 2020 as above; Carter, M., Van Bergen, P., Stephenson, J., Newall, C., & Sweller, N. (2020). Prevalence, Predictors and Sources of Information Regarding Neuromyths in an Australian Cohort of Preservice Teachers. *Australian Journal of Teacher Education*, 45(10). <https://doi.org/10.14221/ajte.2020v45n10.6>
- 10 Hughes et al. 2020 as above.
- 11 Dekker, S., Lee, N. C., Howard-Jones, P., & Jolles, J. (2012). "Neuromyths in Education: Prevalence and Predictors of Misconceptions among Teachers." *Frontiers in Psychology*, 3, 429. <https://doi.org/10.3389/fpsyg.2012.00429>
- 12 Jha, T. [*Knowledge is Power: What do teachers believe about learning?*](#), Analysis Paper 92 (Sydney: Centre for Independent Studies, October 2025).
- 13 Fernández, J. G., Martínez Molina, A., Vadillo Nistal, M. Á., & Ferrero González, M. (2025). "Beyond neuromyths: Examining in-service teachers' misconceptions about teaching and learning." *Teaching and Teacher Education*, 165, Article 105132. <https://doi.org/10.1016/j.tate.2025.105132>
- 14 Fernández, J. G., Martínez Molina, A., Vadillo Nistal, M. Á., & Ferrero González, M. (2025). Beyond neuromyths: Examining in-service teachers' misconceptions about teaching and learning. *Teaching and Teacher Education*, 165, Article 105132. <https://doi.org/10.1016/j.tate.2025.105132>
- 15 Coe, R., Cesare Aloisi, Steve Higgins and Lee Elliot Major, [*What Makes Great Teaching? Review of the Underpinning Research*](#) (London: Sutton Trust, 2014).
- 16 Birch, R. [*Reimagining teacher professionalism: Why standards must be part of ITE reform*](#), CIS Analysis Paper 64 (Sydney: Centre for Independent Studies, March 2024).
- 17 Willingham, D. T. (2009). *Why Don't Students Like School? A Cognitive Scientist Answers Questions About How the Mind Works and What It Means for the Classroom*. Jossey-Bass, San Francisco.
- 18 Howard-Jones, P., Franey, L., Mashmouhi, R. and Liao, Y (2009). The Neuroscience Literacy of Trainee Teachers. Paper presented at the British Educational Research Association Annual Conference, University of Manchester, 2-5 September 2009 and Van Dijk, W., & Lane, H. B. (2018). The brain and the US education system: Perpetuation of neuromyths. *Exceptionality*, 28(1), 16-29. <https://doi.org/10.1080/09362835.2018.1480954>
- 19 Kirschner, P. A., Sweller, J & Clark, R. E. (2006) "Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching", *Educational Psychologist*, 41:2, pp. 75-86, http://dx.doi.org/10.1207/s15326985ep4102_1
- 20 Bellert, A. and Graham, L. (2013). Neuromyths and neurofacts: Information from cognitive neuroscience for classroom and learning support teachers. *Special Education Perspectives*, 22:2, pp. 7-20. <https://hdl.handle.net/1959.11/14314>

- 21 Adesope, O. O., Trevisan, D. A., & Sundararajan, N. (2017). Rethinking the Use of Tests: A Meta-Analysis of Practice Testing. *Review of Educational Research*, 87(3), 659-701. <https://doi.org/10.3102/0034654316689306>
- 22 Betts, K., Miller, M., Tokuhama-Espinosa, T., Shewokis, P., Anderson, A., Borja, C., Galoyan, T., Delaney, B., Eigenauer, J., & Dekker, S. (2019). International report: Neuromyths and evidence-based practices in higher education. Online Learning Consortium: Newburyport, MA. <https://files.eric.ed.gov/fulltext/ED599002.pdf>
- 23 Reiner, C., and Willingham, D. (2010). The Myth of Learning Styles. *Change: The Magazine of Higher Learning*, 42:5, pp 32-35.
- 24 Pashler, H., McDaniel, M., Rohrer, D. and Bjork, R. (2008), Learning Styles: Concepts and Evidence, *Psychological Science in the Public Interest*, 9:3. <https://doi.org/10.1111/j.1539-6053.2009.01038.x>
- 25 Carter, M., Van Bergen, P., Stephenson, J., Newall, C., & Sweller, N. (2020). Prevalence, predictors and sources of information regarding neuromyths in an Australian cohort of preservice teachers. *Australian Journal of Teacher Education*, 45(10). <https://doi.org/10.14221/ajte.2020v45n10.6>
- 26 Hughes, B, Sullivan, K. A., and Gilmore, L (2020), Why do teachers believe educational neuro-myths? *Trends in Neuroscience and Education*, Vol. 21, 100145. Available from: <https://doi.org/10.1016/j.tine.2020.100145>
- 27 Kim, M & Sankey, D (2017). Philosophy, neuroscience and pre-service teachers' beliefs in neuro-myths: A call for remedial action, *Educational Philosophy and Theory*, 50:13, pp. 1214-1227 DOI: <https://doi.org/10.1080/00131857.2017.1395736>
- 28 Newton, P. M. and Salvi, A. (2020). How Common Is Belief in the Learning Styles Neuromyth, and Does It Matter? A Pragmatic Systematic Review. *Frontiers in Education* 5:602451.
- 29 Schiefele, U., Krapp, A. and Winteler, A. (1992), 'Interest as a predictor of academic achievement: A meta-analysis of research', in Renninger, K. A., Hidi, S. and Krapp, A. (eds), *The Role of Interest in Learning and Development*, Lawrence Erlbaum Associates, Hillsdale, NJ, pp. 183–212.
- 30 Fernández, J. G., Martínez Molina, A., Vadillo Nistal, M. Á., & Ferrero González, M. (2025). Beyond neuromyths: Examining in-service teachers' misconceptions about teaching and learning. *Teaching and Teacher Education*, 165, Article 105132. <https://doi.org/10.1016/j.tate.2025.105132>
- 31 Letrud, K. (2012). A rebuttal of NTL Institute's learning pyramid. *Education*, 133(1), 117–124.
- 32 Willingham, D. T. (2013, March 6). "Why the "learning pyramid" is wrong." *The Washington Post*. Available from <https://www.washingtonpost.com/news/answer-sheet/wp/2013/03/06/why-the-learning-pyramid-is-wrong/>
- 33 Sweller, J., (2022). *Some critical thoughts about critical and creative thinking*, CIS Analysis Paper 32 (AP32), February 2022.
- 34 A Welch's independent-samples t-test found this difference was statistically significant ($t(130) = -2.18$, $p = .031$), with a small effect size (Cohen's $d = -0.27$)
- 35 Jha, T. (2023), *Submission to the Legislative Council Inquiry into the State Education System in Victoria*, Centre for Independent Studies, Sydney. Available from: <https://www.cis.org.au/submission/submission-to-the-legislative-council-inquiry-into-the-state-education-system-in-victoria/>
- 36 House of Commons Education Committee (2024), *Teacher Recruitment, Training and Retention, Second Report of Session 2023–24*, House of Commons, London. Available from: <https://publications.parliament.uk/pa/cm5804/cmselect/cmeduc/119/report.html>

Teachers' professional knowledge is a key component of teaching quality. Education policy increasingly seeks to be more specific about teachers' expected professional knowledge to align it with the best available evidence on how students learn. But reforms to initial teacher education and classroom practice, while welcome, leave a key unanswered question: how do systems know what teachers already know when it comes to the science of learning?

Informed by earlier research, this report presents the results of a 10-item survey of a broadly representative sample of 377 Australian teachers, examining whether teachers have been equipped with the professional knowledge they need to make effective instructional decisions in the classroom. The findings point to a deeper problem than isolated misconceptions: Australian teachers do not appear to share a coherent and consistently evidence-aligned body of professional knowledge about how learning occurs, and how that knowledge should inform instruction.

About the Author



Trisha Jha is a Research Fellow in the Education program, where she leads a stream of work on the science of learning, as well as projects on school improvement and educational policy.

Trisha has previously had roles as a secondary teacher, including through the Teach for Australia program, in state and independent schools in regional Victoria. She has also worked as a senior policy adviser to opposition leaders in Victoria.

She holds a Masters of Teaching with a specialisation in Research from Deakin University and a Bachelor of Arts in International Relations from the Australian National University.

Related Works

Trisha Jha. *Knowledge is Power. What do teachers believe about learning.* Analysis Paper 91, October 2025 <https://www.cis.org.au/wp-content/uploads/2025/10/AP92-Knowledge-is-Power.pdf>

Trisha Jha. *What is the Science of Learning?* CIS Analysis Paper 63, February 2024 <https://www.cis.org.au/publication/what-is-the-science-of-learning/>

Trisha Jha. *Implementing the science of learning: Teacher experiences.* CIS Research Report 47, February 2024 <https://www.cis.org.au/publication/implementing-the-science-of-learning-teacher-experiences/>



Analysis Paper 117 (AP117) • ISSN: 2209-3753 (Online) 2209-3745 (Print) • ISBN: 978-1-923462-71-7
Published October 2026 by The Centre for Independent Studies Limited. Views expressed are those of the authors and do not necessarily reflect the views of the Centre's staff, advisors, directors or officers.

© Centre for Independent Studies (ABN 15 001 495 012)

This publication is available from the Centre for Independent Studies. Visit [cis.org.au](https://www.cis.org.au)