

High Quality Preschool Teaching – Wave 1

“Sustained high quality teaching is the right of every child”

What educators do matters! In preschool settings, children must experience learning that is engaging and builds success for life with a focus on the following 5 Learning Outcomes¹:

- Children have a strong sense of identity
- Children are connected with and contribute to their world
- Children have a strong sense of wellbeing
- Children are confident and involved learners
- Children are effective communicators

Evidence-based early childhood pedagogy is underpinned by 5 Principles²:

- Secure, respectful and reciprocal relationships
- Partnerships
- High expectations and equity
- Respect for diversity
- Ongoing learning and reflective practice

This pedagogy requires educators to draw upon a range of practices to promote children’s learning by adopting holistic approaches, being responsive to children, planning and implementing learning through play, intentional teaching, creating positive learning environments, valuing cultural competence, providing continuity of learning and transitions and assessing and monitoring children’s learning that supports high level learning for each child.

The power of teachers to enact high level learning for each child comes from³:

- Building expert learners⁴ - **Rigour**
- Personalising and connecting learning⁵ - **Relevance**
- Creating safe conditions⁶ - **Relationships**

TFEL Domain 3 Building expert learners with rich conceptual knowledge and mastery of complex skills Rigour	TFEL Domain 4 Personalize and connect learning in real world/ authentic contexts Relevance	TFEL Domain 2 Create safe conditions for rigorous learning through high expectations for achievement and behaviour Relationships
<p><i>Highly effective teachers demonstrate a flexible range of instructional strategies and reflect deep knowledge of curriculum, assessment and reporting frameworks, e.g.</i></p> <ul style="list-style-type: none"> ✓ Intentionality ✓ Explicitness ✓ Differentiation ✓ Assessment as, for and of learning <p><i>Highly effective teachers have high expectation and design learning tasks that challenge, engage and extend thinking, e.g.</i></p> <ul style="list-style-type: none"> ✓ Problem solving and critical and creative thinking ✓ Metacognition ✓ Dialogue ✓ Learning Dispositions 	<p><i>Highly effective teachers are adept with monitoring, assessing and feeding back on learner progress and achievement, e.g.</i></p> <ul style="list-style-type: none"> ✓ Explicit success criteria ✓ Targeted feedback to learners ✓ 12 months or more growth for each learner <p><i>Highly effective teachers develop active learning partnerships and negotiate learning goals with students, e.g.</i></p> <ul style="list-style-type: none"> ✓ Posing of guiding questions ✓ Connection to prior knowledge and the needs and interests of learners ✓ Respond to learner feedback ✓ Multiple entry points 	<p><i>Highly effective teachers deepen their pedagogical content knowledge and keep up to date with research about how students learn, e.g.</i></p> <ul style="list-style-type: none"> ✓ Challenge their own thinking and that of others ✓ Improve performance through observation and feedback ✓ Develops understanding of curriculum standards through moderation <p><i>Highly effective teachers are proficient at maintaining an optimal classroom climate for learning, e.g.</i></p> <ul style="list-style-type: none"> ✓ Learning and behaviour referenced against criteria for high standards ✓ Foster resilience and risk taking ✓ Skills for collaboration ✓ Skills for communicating in multiple modes ✓ Skills for self-regulation and responsibility

¹ Commonwealth of Australia 2009 *Belonging Being and becoming The Early Years Learning Framework*

² Ibid pp12-13

³ Highly Effective Teaching for 21C learning Joy Milward

⁴ TFEL Framework Domain 3 https://www.decd.sa.gov.au/sites/g/files/net691/t/fel_framework_guide_complete.pdf

⁵ Ibid Domain 4

⁶ Ibid Domain 2

Know thy impact – What educators do matters

General			Literacy			Maths	
Instructional Strategy	Effect Size ⁷	Growth ⁸	Instructional Strategy	Effect Size ⁹	Growth ¹⁰	Instructional Strategy	Effect Size ¹¹
Teacher estimates of achievement	1.62						
Collective teacher efficacy	1.57						
Visible Learning	1.44	+8m					
Self-reported grades	1.33						
Response to Intervention	1.07						
						Student think alouds	0.98
Micro Teaching	0.90						
Classroom Discussion; Teacher Clarity	0.80						
Providing feedback	0.73	+8m					
						Providing feedback	0.71
Reciprocal Teaching; Creativity programs	0.70						
Providing formative evaluation	0.68						
						Explicit teaching (Direct Instruction)	0.65
			Vocabulary Programs	0.62			
Explicit teaching practices (Direct Instruction); Self-verbalisation & self-questioning; Time on task; Spaced vs Mass practice; Peer tutoring;	0.60					Problem-solving teaching	0.60
Effective classroom management	0.52		Oral Language Interventions		+5m		
Teacher-student relationships; Questioning; Play programs	0.50						
Early Intervention	0.47	+5m					

Hattie developed a way of ranking various influences in different meta-analyses related to learning and achievement according to their effect sizes to find out what works best in education. He found that the average effect size of all the interventions he studied was 0.40. Hattie's research is now based on nearly 1200 meta-analyses (originally 800 in 2009) and is being constantly updated through his visualization of effect sizes available from: <http://visible-learning.org/nvd3/visualize/hattie-ranking-interactive-2009-2011-2015.html>.

⁷ Hattie J 2009 Visible Learning; 2012; 2015

⁸ Teaching and Learning Toolkit Australia <http://evidenceforlearning.org.au/the-toolkit/>

⁹ Hattie J 2009 Visible Learning; 2012; 2015

¹⁰ Teaching and Learning Toolkit Australia <http://evidenceforlearning.org.au/the-toolkit/>

¹¹ Hanover Research 2014 Best Practices in Maths Interventions <http://www.hanoverresearch.com/media/Best-Practices-in-Math-Interventions.pdf>

Further information: High Quality Teaching Strategies

Teacher estimates of achievement (Effect size 1.62)

Students are more likely to meet expectations than not, whether these expectations are good, bad, correct or misguided. Not only do student achievement outcomes support the idea of establishing high expectations for all students, but the learners themselves appreciate the effectiveness of setting equal, high expectations for both themselves and their peers. Hattie suggests that such expectations are self-fulfilling prophecies, as “students are reasonably accurate in informing on when teachers favour some students over others¹²”, by placing higher expectations on some. While differentiated instruction, or tailoring teaching approaches to students’ individual needs, is paramount to high achievement, it is important to distinguish between differentiating teaching approaches and establishing expectations, ensuring that all students are challenged equally, even if the desired outcomes for each one may vary significantly¹³.

Collective Teacher Efficacy (Effect size 1.57)

Teacher quality impacts significantly on students’ learning and the role of professional learning and collaboration can play a role in improving teacher quality. Collaborative practices between teachers within and across schools where teachers can share successful and innovative teaching practices that explicitly aims to improve student outcomes is a powerful strategy. Collaborative approaches should include a focus on students’ outcomes, open classrooms, use of external expertise and have a whole school focus¹⁴.

Visible Learning (Effect size 1.44; +8m)

Visible teaching and learning occurs when learning is the explicit goal: when there is feedback given and sought and when there are active, passionate and engaging people, including teachers, students and peers participating in the act of learning. Hattie points out that the main feature of the research evidence is that “the biggest effects on student learning occur when teachers become learners of their own teaching and when students become their own teachers. This allows students to show self-regulatory attributes that are most desirable for learners, such as self-monitoring, self-evaluation, self—assessment and self-teaching”¹⁵. This approach allows learners to think about their own learning more explicitly. This is usually by teaching students specific strategies to set goals, and monitor and evaluate their own academic development and has high impact (+8months) for very low cost, based on extensive evidence¹⁶.

Self-reported Grades (Effect size 1.33)

Children are most accurate when predicting how they will perform. Hattie states that, that if he could write his book Visible Learning for Teachers again, he would re-name this learning strategy “**Student Expectations**” to express more clearly that this strategy involves the teacher finding out what are the student’s expectations and pushing the learner to exceed these expectations. Once a student has performed at a level that is beyond their own expectations, he or she gains confidence in his or her learning ability.

Response to Intervention (Effect size 1.07)

This is an educational approach that provides early, systematic assistance to children who are struggling in one or many areas of their learning. RTI seeks to prevent academic failure through early intervention and frequent progress measurement.

Micro Teaching (Effect size 0.90)

Hattie¹⁷ describes micro-teaching as a practice that “typically involves student-teachers conducting (mini-) lessons to a small group of students, and then engaging in a post-discussion about the lessons.” They are usually video-taped for later analysis allowing teachers to get a microscope-view on their own teaching. Under the guidance of a supervisor, the student-teacher is

¹² Hattie 2009 p 122

¹³ <http://danhaesler.com/wp-content/uploads/2015/02/High-Expectations-Mindset.pdf>

¹⁴ NSW Education & Communities October 2014 What works best: Evidence based practices to help improve NSW student performance

¹⁵ <http://www.education.vic.gov.au/Documents/about/research/ravisiblelearning.pdf>

¹⁶ Teaching and Learning Toolkit Australia <http://evidenceforlearning.org.au/the-toolkit/>

¹⁷ Visible Learning 2009 p 112

first asked to present a self- feedback of the mini lesson. The team then gives feedback to provide positive reinforcement and constructive criticism.

Classroom Discussion (Effect size 0.80)

This is a method of teaching that involves the entire class in a discussion. The teacher stops lecturing and students get together as a class to discuss an important issue. Classroom discussion allows students to improve communication skills by voicing their opinions and thoughts. Teachers also benefit from classroom discussion as it allows them to see if students have learnt the concepts that are being taught. Moreover, a classroom discussion creates an environment where everyone learns from each other¹⁸.

Teacher Clarity (Effect size 0.80)

It is important for the teacher to communicate the intentions of the learning and the notion of what success means for these intentions.

Reciprocal teaching (Effect size 0.70)

Reciprocal teaching was devised as an instructional process to teach students cognitive strategies that might lead to improved learning outcomes (initially in reading comprehension). The emphasis is on teachers enabling their students to learn and use cognitive strategies such as summarizing, questioning, clarifying and predicting and these are supported through dialogue between teacher and students as they attempt to gain meaning from the learning.

Creativity programs (Effect size 0.70)

Creativity programs are grounded in a common idea that training, practice and encouragement of using creative thinking skills can improve an individual's ability to use creative thinking techniques such as thinking with fluency, flexibility and with an element of the unusual responses to questions or problems.¹⁹ Like most other programs, an emphasis on instructional strategies and direct instruction makes a major difference in the effectiveness of creativity programs. Those programs, across learning areas, with a high level of structuring, questioning and responding to student questioning have the biggest impact. The effects were greatest in mathematics (0.89), science (0.78) then reading (0.48). The most successful programs also focus on developing thinking strategies.

Providing feedback (Effect size 0.73; +8m)

Based on moderate evidence feedback has high impact for very low cost (+ 8 months). Feedback is information given to the learner and/or the teacher about the learner's performance relative to learning goals. It should aim to (and be capable of) producing improvement in students' learning. Feedback redirects or refocuses either the teacher's or the learner's actions to achieve a goal, by aligning effort and activity with an outcome. It can be about the learning activity itself, about the process of activity, about the student's management of their learning or self-regulation or (the least effective) about them as individuals. This instructional feedback can be verbal, written, or can be given through tests or via digital technology and should focus on informing students the specific things they need to do in order to get it right or to improve their performance in some way. It can come from a teacher or someone taking a teaching role, or from peers. In addition, when teachers seek, or at least are open to, feedback from students as to what students, know, what they understand, where they make errors, when they have misconceptions, when they are not engaged – the teaching and learning is most powerful. Feedback to teachers makes the learning visible.²⁰

Providing formative evaluation (Effect size 0.68)

Formative evaluation provides feedback to teachers on what is happening in their classroom so they can ask "How am I going?" in achieving the learning intentions they have set for their students, such that they can decide "Where to next?" It is the attention to the purposes of innovations, the willingness to seek negative evidence (ie seeking evidence on where students are not doing well) to improve the teaching innovation, the keenness to see the effects on all students, and the openness to new experiences that make the difference. The major message is for teachers to attention to the formative effects of their teaching, as it is these

¹⁸ <http://visible-learning.org/glossary/>

¹⁹ Hattie 2009 p 155

²⁰ Hattie p 173

attributes of seeking formative evaluation of the effects (intended or unintended) of their programs that makes for excellence in teaching²¹.

Explicit Teaching Practices (Direct Instruction) (Effect size 0.60)

Explicit teaching practices involve teachers clearly showing students what to do and how to do it, rather than having students discover or construct information for themselves. It recognises that learning is a cumulative and systematic process, starting with building strong foundations in core skills in literacy and numeracy. Effective teacher practices ensure that students have clear instruction on what is expected of them, and what they need to learn from tasks. It ensures that students are given time to engage with the learning process, ask questions and get clear feedback. Students who experience explicit teaching practices make greater learning gains than students who do not experience these practices.

Self-Verbalisation & Self-Questioning (Effect size 0.60)

This is a form of self-regulation and is of more use to those in the early to immediate phase of skill acquisition and for those of lower to middle ability. The effects were higher for pre-lesson questioning and post lesson questioning compared to questions dispersed during the lesson, and where there was teacher modelling. The most effective questions are high order - 'Why?' 'How?' and 'Which is best?' questions that really make students think. Students need to be given time to think, and do better if they work in pairs than work alone²².

Time on Task (Effect size 0.60)

This is practice needs to be deliberate, particularly when learning new material. Deliberate practice refers to the relevant practice activities aimed to improve performance, at an appropriate, challenging level of difficulty, and enable successive refinement by allowing for repetition, giving room to make and correct errors, and providing informative feedback to the learner²³.

Spaced and Mass practice²⁴ (Effect size 0.60)

This is a distributed practice (not just rote learning and lots of practice). It is the frequency of different opportunities rather than spending 'more' on task that makes the difference in learning. Teachers need to provide deliberate practice opportunities until minimal levels of mastery (defined by success criteria) are met. Deliberate practice increases opportunities to not only enhance mastery but also fluency. This is not drill and practice but rather use of a range of effective practices (eg direct instruction, peer-tutoring, mastery learning and feedback).

Peer tutoring (Effect size 0.60)

If the aim is to teach students self-regulation and control over their own learning then they must move from being students to being teachers of themselves. Peer tutoring has many academic and social benefits for both those tutoring and those being tutored. Research has found that when peer tutoring is student controlled (when peers are involved in setting goals, monitoring performance, evaluating performance and selecting rewards), the effects are greater than when it is controlled by teachers. We need to remember that students can be producers of teaching and learning, rather than just recipients.

Effective classroom management (Effect size 0.52)

This is important for creating the conditions for learning and links directly to student performance. Research points to the positive effect of well-managed classrooms²⁵ on:

- Student behaviour (Effect size 0.71)
- Student engagement (Effect size 0.62)
- Student Achievement explicitly (Effect size 0.52)

There are 5 key pro-active effective strategies²⁶:

- Foster and maintain student engagement
- Establish and teach classroom rules to communicate expectations for behaviour

²¹ Hattie p 181

²² http://www.teacherstoolbox.co.uk/T_effect_sizes.html#Questioning

²³ Hattie 2009 p 185

²⁴ Hattie 2009 pp185-6; <http://research.acer.edu.au>

²⁵ NSW Education & Communities October 2014 What works best: Evidence based practices to help improve NSW student performance p 20

²⁶ NSW Education & Communities October 2014 What works best: Evidence based practices to help improve NSW student performance p 21

- Build structures and establish routines
- Reinforce positive behaviour
- Consistently impose consequences for misbehaviour

Teacher-student relationships (Effect size 0.50)

In classes with person-centred teachers, there is more engagement, more respect of self and others, there are fewer resistant behaviours and there are higher achievement outcomes. Building relationships with student implies agency, efficacy, and respect by the teacher for what the child brings to the class (from home, culture, peers) and allowing the experiences of the child to be recognised in the classroom. Developing relationships requires the teacher to have well developed skills such as skills of listening, empathy, caring and having positive regards for others²⁷.

Questioning²⁸ (Effect size 0.50)

Feedback can also come from teachers asking questions of their students, although it is an adage that teachers already know the answer to most of the questions they ask. The use of questions, especially higher order questions can be a powerful strategy for building comprehension and opens up possibilities of meaning. Questioning can lead to improved comprehension, learning and memory. So much of class time is spent by teachers asking questions of their students but usually these are not open, inquiry questions, they are “display questions” that the teacher knows the answer to and do not enhance understanding or thinking. Skilled, high cognitive questioning by teachers can guide students to thoughtful and reflective answers and so facilitate higher levels of academic achievement. In addition perhaps more important than teacher questioning is analysing the questions that students ask. Structuring class sessions to entice, teach and listen to students’ questioning of students is powerful.

Play programs (Effect size 0.50)

Play promotes improved performance outcomes both in cognitive-linguistic and affective0-social domains. Socio-dramatic play has the most striking effect and the smallest effect comes from imaginative play. Adult-directed play showed no more gains than for other play conditions. For younger children, play makes a difference and this difference is likely to be related to learning about peer relations and learning how to learn from peers, facing and meeting challenges, the consequence of deliberate practice in play, and the satisfaction from deciding or becoming aware of both the learning intentions and the success criteria from being involved in play.

Early Intervention (Effect size 0.47; +5m)

The overall effect of early intervention (any intervention with pre-school aged students) is .50 and for pre-school programs (eg kindergarten) is 0.52. The overall finding is that early intervention programs are more effective if they are structured, intense, include about 15 or more children, and the children are in the program for up to 13 hours a week²⁹. This is supported by the Australian Teaching and Learning Toolkit, where based on extensive evidence, there is moderate impact (+5 months) for very high costs and appear to be particularly beneficial for children from low income families.³⁰

Literacy

²⁷ Hattie 2009 p 118

²⁸ Hattie 2009 pp 182-3

²⁹ Hattie 2009 p 58

³⁰ Australian Teaching and Learning Toolkit Early Years Intervention

Vocabulary Programs (0.62 Effect size)

Vocabulary instruction and knowledge of word meanings generally helps growth in reading comprehension. The most effective vocabulary teaching methods include both definitional and contextual information, involve students in deeper processing, and give students more than one or two exposures to the words they were to learn. The mnemonic keyword method also has positive effects on recall of definitions and sentence comprehension³¹. (Refer Further Information: The Big 6: Vocabulary)

Oral Language Interventions (+5 months growth)

Oral language interventions emphasize the importance of spoken language and verbal interaction in the classroom and have been found to have moderate impact (+ 5 months) for very low cost, based on extensive evidence³². They are based on the idea that comprehension and reading skills benefit from explicit discussion of either the content or processes of learning, or both. Oral language approaches include:

- Targeted reading aloud and discussing books with young children
- Explicitly extending students' spoken vocabulary
- The use of structured questioning to develop reading comprehension

Mathematics

Student Think Alouds (Effect size 0.98)

Student 'think-alouds' are student-centric and involve asking students to articulate their thinking processes as they solve maths problems. This is proven to be effective in engaging students in activities requiring verification, such as evaluating decisions and checking calculations.³³

Piagetian programs (Effect size 0.73)

Hattie found that the relationship between the Piagetian stage (logical operations, concrete, formal-operational) and achievement in Maths is very high (0.73). Thus knowing the ways in which students think, and how this thinking may be constrained by their stages of development may be most important to how teachers choose material and tasks, how the concept of difficulty and challenge can be realized in different tasks and the importance of developing successive and simultaneous thinking.³⁴

Providing feedback (Effect size 0.71)

The power of feedback to students learning mathematics was found to have the highest effect when teachers provided feedback data or recommendations to students. Feedback is information given to the learner and/or the teacher about the learner's performance relative to learning goals. It should aim to (and be capable of) producing improvement in students' learning. Feedback redirects or refocuses either the teacher's or the learner's actions to achieve a goal, by aligning effort and activity with an outcome. It can be about the learning activity itself, about the process of activity, about the student's management of their learning or self-regulation or (the least effective) about them as individuals. This instructional feedback can be verbal, written, or can be given through tests or via digital technology and should focus on informing students the specific things they need to do in order to get it right or to improve their performance in some way. It can come from a teacher or someone taking a teaching role, or from peers. In addition, when teachers seek, or at least are open to, feedback from students as to what students know, what they understand, where they make errors, when they have misconceptions, when they are not engaged – the teaching and learning is most powerful. Feedback to teachers makes the learning visible.³⁵

³¹ Hattie 2009 p 133

³² <http://evidenceforlearning.org.au/toolkit/oral-language-interventions/>

³³ <http://www.ascd.org/publications/researchbrief/v3n13/toc.aspx>

³⁴ Hattie 2009 p42

³⁵ Hattie p 173

Explicit Teaching Practices (Direct Instruction) (Effect size 0.65)

Explicit teaching practices involve teachers clearly showing students what to do and how to do it, rather than having students discover or construct information for themselves. It recognises that learning is a cumulative and systematic process, starting with building strong foundations in core skills in literacy and numeracy. Effective teacher practices ensure that students have clear instruction on what is expected of them, and what they need to learn from tasks. It ensures that students are given time to engage with the learning process, ask questions and get clear feedback. Students who experience explicit teaching practices make greater learning gains than students who do not experience these practices.

Peer assisted learning (Effect size: 0.62)

The overall effects of the use of peers as co-teachers (of themselves and of others) in classes is, overall, quite powerful. If the aim is to teach students self-regulation and control over their own learning then they must move from being students to being teachers of themselves. One way to achieve this is to use peer tutoring. Peer tutoring in mathematics is effective, when used as a supplement to direct instruction. Cross age tutors (Effect size 0.79) are more effective than same-aged peers (Effect size 0.52) and adult tutors (Effect size 0.54). When students become the teachers of others, they learn as much as those they are teaching. When they have some control or autonomy over this teaching, the effects are higher³⁶.

Problem solving teaching (Effect size 0.60)

Hattie found significant direct links between problem solving and various measures of basic performance, in particular skills in basic mathematics. A format consisting of full problem statements supported by diagrams, figures or sketches directly related to better performance. His meta-analysis also supported the power of teaching the heuristic method of problem solving, which includes understanding the problem, obtaining a plan of the solution, carry out the plan and examine to solution obtained³⁷.

Mathematics and mindset

People with a fixed mindset see intelligence as static which leads to a desire to look smart and therefore a tendency to avoid challenges, give up easily, see effort as fruitless, ignore useful negative feedback and feel threatened. Those with a growth mindset believe intelligence can be developed and leads to a desire to learn and therefore a tendency to embrace challenges, persist in the face of setbacks, see effort as the path to mastery, learn from criticism and find lessons and inspiration in the success of others. As a result, they reach an even higher level of achievement. According to Boaler³⁸ (2016), the findings that the brain can grow, adapt and change assures us that with the right teaching and messages, children can be successful in Maths, and everyone can achieve at the highest levels of school. Scientific evidence suggests that the ability to be successful comes from the child's approach to life and learning, the messages they receive about their potential and the opportunities they have to learn. "Teacher beliefs and the choices teachers make, can have a major impact on how students view mathematics and their learning of it."³⁹ Children need to have the self-belief that leads to a mathematical mindset which requires a change in the way students consider themselves and the way they approach mathematics. With a growth mindset (and supported by teachers who appreciate the importance of mathematical mindsets and developing the perspective and strategies to change students' mindsets), student's learning approaches can become more positive and successful.⁴⁰

Creating powerful Mathematical Learners

Powerful learners never give up, are persistent, don't need an easy solution, are open to challenges, committed to what they are learning, open to failure, engaged, empowered, celebrate failure, ask the right questions, fail often to succeed sooner, apply their learning and work with information so they can understand it. In order to do this we need to change the conceptual narrative of teachers, from TELL to ASK.

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³⁶ Hattie 2009 p186-7

³⁷ Hattie 2009 p210

³⁸ Boaler J 2016 Mathematical Mindsets USA Jossey-Bass

³⁹ Principal as Mathematics Leader p11

⁴⁰ Blackwell et al 2007 cited in Boaler p6)

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