Changing the Educational Landscape using Neuroscience in Classroom Environment Design

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ABSTRACT

Experiences deepen children's neural pathways in the brain during the critical growth period of birth to five years. This article will explore the transformation of teacher practices when aligning the needs of the developing brain with the design of the learning environment. An overview of the what, why and how of implementing the Brain-SET Environments Formula™ will be explored in conjunction with developing brain-friendly spaces for learning. Qualitative data, in the form of anecdotal records, will describe outcomes and be used as evidence of the successful implementation of this pedagogy.

THE BIG PICTURE

The structure of education today originated from the Victorian era of the 1800s. Many women were forced to get jobs in textile factories to support their families. Think of a factory assembly line. Everyone starts at the same time, does the same tasks with the same expected outcome, takes breaks at the same time, and ends the day at the same time – ready to do it all again tomorrow. This assembly line of productivity became the model for the education system as formal schooling grew more popular. Today, in many countries, schools and classrooms continue with this approach to teaching and learning.

The results from the Programme for International Student Assessment (PISA), an Organisation for Economic Co-operation and Development in 2022 have indicated that overall, the level of education is suffering in most countries of the world. Couple this with the limited or augmented education that young children accessed during the two years of the pandemic, and it's easy to see that we must catch up and support children's learning in a new and innovative way. Globally, there are many groups and individuals who are education thought leaders. They are lighting little fires of educational reform - that together are becoming a bonfire for change across the world. One revolutionary fire for change comes from Australia. The Brain-SET Environments Formula™ is a pedagogical process for empowering teachers and children through the intersection of theory, research, neuroscience and over 40 years of experience in the education field.

What is Brain-SET™?

We have heard the saying “We stand on the shoulders of giants” which means that we use the knowledge and research that has gone before us to inform current practices. The Brain-SET Environments Formula does exactly that, along with some original and revolutionary additions. The key concepts of Vygotsky, Piaget, Maslow, Bronfenbrenner, Montessori, Reggio Emilia, Steiner, Froebel, Smilansky and others have been melded together to underpin the concepts of Brain-SET. Add in the understanding of different approaches to learning that include inquiry, project-based, play, and critical thinking and we have a formula for classroom success. Incorporating 40 years of teaching experience and extensive

neuroscience research brings us closer to understanding the foundations and fundamental principles of this innovative method for cultivating enriching early childhood learning environments.

Brain-SET was 'born' in a coffee shop in Australia. It was originally a concept that was sketched on the coffee shop napkin, taken home, and redrawn with text and diagrams that informed the structure of what is now a fully developed pedagogy. Understandings related to the interconnectedness of the brain's regions and functions were used to develop a simplified diagram of the brain. Three levels of the brain were identified - the Survival (brainstem), Emotional (limbic system) and Thinking (cortex) parts of the brain. This is the S.E.T. in Brain-SET.

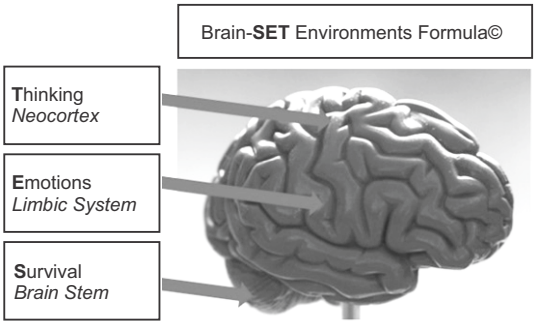

Figure 1: The Brain-SET levels of the brain.
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Brain-SET empowers, informs, and guides teachers to design their classroom learning environment to support the needs of each child's developing brain. When the environment is set up in this way, children and teachers are calmer, which adds to their wellbeing and offers opportunity for deepening relationships. Learning becomes a natural and playful process. The children gain agency in their learning whilst the teacher acts as a facilitator to guide experiences that support development.

Brain-SET is particularly important for those who have experienced trauma. Ensuring that we create an environment that the brain sees as safe reduces the level of cortisol (stress hormone). When cortisol is decreased, the brain can relax instead of being on high alert. Children can think clearly and develop positive emotions toward learning and personal interactions.

Traditionally, when designing the learning environment, teachers make practical decisions and consider the room size, resources available, number of children and lines of sight. Decisions are made about positioning the painting area near the sink or outside for easy clean up, the quiet reading area is in a corner of the room opposite to where the noisy block or construction area is situated. Traffic flow, table positions, storage considerations, spaces to eat, and access to bathroom facilities all play a part in the decisions teachers make when designing where and how the children will learn. But designing a 'brain-rich' learning environment is critical and is much more than where to put the furniture!

Teaching habits

Personal teaching preferences come into consideration too. Some teachers are happy to encourage children to create, use imagination and facilitate discussions and conversations that promote children's thinking. Other teachers prefer to use a little more structure and provide planned and organised activities for the children. Something called 'personal inclination' can occur with teachers when thinking about approaches to learning and teaching. Certain individuals argue that justifying the retention of traditional methods stems from their longstanding practice of teaching in the same manner and their lack of intention to alter it, while others contend that adherence to these methods, which were effective in their education, remains valid. Teaching happens based on their personal ideas – not on research. What if there was another way?

What if we blended the best of all that has been highlighted here? What if we could create a classroom that supported children and teachers to grow and learn together by supporting the needs of the brain? What if we could design the learning environment, with practical positioning of the furniture and a carefully, curated selection of learning materials? What if we could do this

while achieving a calm space for holistic development – including the brain?

Why Brain-SET™?

Research tells us that 90% of a child's brain is still being developed during the first five years of life. A child's brain has billions of neurons. When rich, sensory learning experiences are available to children, around one million synaptic connections are being made every second (Harvard University). This development happens when we provide a range of open-ended, developmentally, and culturally appropriate materials related to the child's interests. If teachers extend and expand on opportunities for learning, synaptic connections and strong neural pathways are formed – meaning that learning happens easily.

Authentic and deep relationships between teacher and child add to the emotional connection to learning. If we think back to the levels of the brain, creating strong relationships that ensure children experience physical and emotional safety and feel loved and valued, opens opportunities for learning through sensory exploration and playful experiences.

How to do Brain-SET™?

Introducing Brain-SET and playful learning experiences occurs gradually and allows children and teachers to appreciate the small but significant changes we are making to the environment. Incorporating practicalities of room size, shape, number of children, and resources available contributes to the design of the classroom as we look at the design elements necessary to calm the brain, ready for learning.

Three Pillars of Design guide the organisation of the learning environment. Design for Learning includes six design elements that shape smaller, and define spaces; Feelings for Learning highlights six considerations for the non-institutional placement of furniture and materials; and Spaces for Learning focuses on five elements related to the size and variety of spaces created in the classroom.

The pillars and design elements are underpinned by critical thinking and learning. We want children to ask questions, analyse data they collect, communicate ideas and solutions, take learning risks, and try something new based on their critical observations. This occurs naturally when the environment is carefully curated and designed with the brain development of the child in mind.

The sixteen elements of design should be seen in multiple areas of the classroom environment. They should overlap and support learning in a variety of ways that complement the interests of the child and achieves desired outcomes in knowledge and skill development.

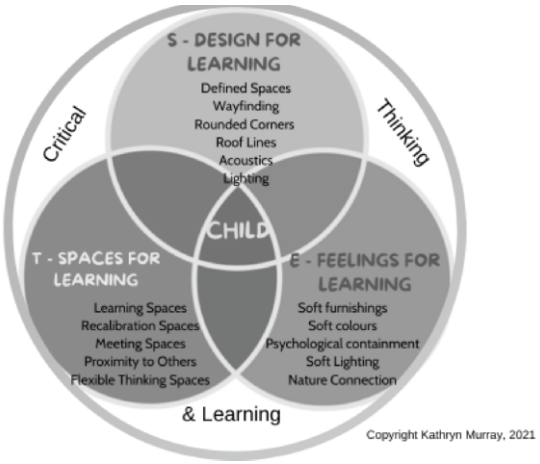

Figure 2: The Brain-SET Pillars of Design. Dr. Kathryn Murray©

Brain-SET Outcomes

The outcomes of implementing the pillars and design elements have been recorded by teachers who have completed the ten hours of Brain-SET training. During and after the training they had coaching in re-designing their classroom spaces. Teachers have offered anecdotal data using observation and documentation related to children's learning.

Criteria such as:

- level of teacher and child well-being through deeper relationships and a calm environment
- increase of children's knowledge due to inquiry related to their interests
- extension of skill development in smaller spaces that allows for repetition and

practising of skills

- reduction of children's challenging behaviour related to their engagement with interest-based learning experiences
- level of calmness in the classrooms
- engagement of children in the smaller, defined spaces supporting curiosity and wonder
- increase of soft skills, such as resilience, confidence, problem-solving
- increase in oral language skills due to the non-threatening nature of the smaller spaces that promote language development in small groups or pairs

These are examples of key outcomes that have been identified when using the Brain-SET Environments Formula in the early childhood classroom. The following responses are a sample provided by Brain-SET teachers and are related to identified outcomes for children, teachers and parents. Teacher comments pertain to children across the 0-5 age group and demonstrate the critical value of designing the learning environment to align with the needs of the brain.

Anthonette is an experienced educator in Los Angeles. She is the lead educator in the two-year-old room and appreciates the effect that the respite (or recalibration or calm area) space has on the overall calmness of the room, adding to the well-being of the children. Anthonette says:

"The calming spaces are my favourite. The things provided for the children are welcoming, inviting, and relaxing, it has materials/items that make you want to go there even if you're not upset or overwhelmed. It's really great to find a space to just breathe and slow down. We have a student that uses it frequently in this way. She goes in and basically makes herself feel comfortable and relaxed. She sits, looks around, and hums a tune. Then she lays down and takes that moment to just be. It's a wonderful addition to our environment. Thank you."

Having intentional spaces is an integral part of Brain-SET. Purposeful, intentional, clearly defined spaces that relate to the interests of the child and are facilitated using open-ended materials make a difference to the learning outcomes. Anthonette comments:

This anecdotal data reminds us that when the environment allows children to experience a sense of safety, feel included and relaxed then calm thinking can occur. Learning how to slow down and relax is not only a good strategy in the early childhood classroom, but also for developing lifelong skills.

Marlene works across several age groups in Los Angeles and has noticed changes in responsive behaviours and learning in several rooms. The children have responded positively, and she has noticed:

"Children have been focused and engaged within the new learning spaces created. The cosiness of the smaller, defined spaces helps children collaborate and build their communication skills as they compromise, negotiate, and get to know each other intimately.

Each and every space within our classroom has seen a positive change from our time with Dr. Murray. We have seen the benefits of seeing each space through its transformation, and the children's excited and warm reactions to each area have validated our growth in classroom design."

Marlene has noticed the calm curiosity that has been created in the classroom.

"Parents have provided so much positive feedback about how inviting and inspiring the classroom environment is and how happy their children are with their classroom."

Marlene and her early learning colleagues have noticed specific levels of engagement with children across the centre. The staff implemented the 16 Elements of Design with effective outcomes for the children. Creating calm spaces supports the children and teachers

and, in turn, reassures parents that their child is learning in an emotionally and physically safe environment.

Kim is the Director of an Early Learning Centre in Australia and has seen changes in her staff and the behaviours of the children.

"As we continuously develop our classroom layout to align with what we took from the Brain-SET Program, we have noticed a huge change in the children's behaviour. The environment is calm leading to a more relaxing atmosphere allowing positive engagement from the children, families and educators.

We find that we are changing our environments with Kathy's teachings in the back of our mind, and this leads to positive professional team meetings.

The children are giving positive feedback with our 2–3-year-old children waking from rest time the other day saying "wow", and "so cool". We have observed the children disperse into smaller groups and engage in meaningful play.

We were and still are very inspired by Dr Kathryn's Brain Set program, and we look forward to having her return to our Service for future professional development."

Ongoing coaching and support ensures that this team of educators continue to support children's development authentically with more children saying "wow" when they engage with the carefully curated learning spaces.

What now?

Teacher planning continues the Brain-SET journey. The focus begins with appreciating the child – building relationships, understanding interests and family dynamics. Utilising professional knowledge to incorporate the expansion of development in all domains, including the brain is vital. These sections help the teacher to identify the child's interests. Armed with this information, the teacher can utilise specific and appropriate materials to be used in the environment. Reflection and evaluation inform any adaptations or extensions

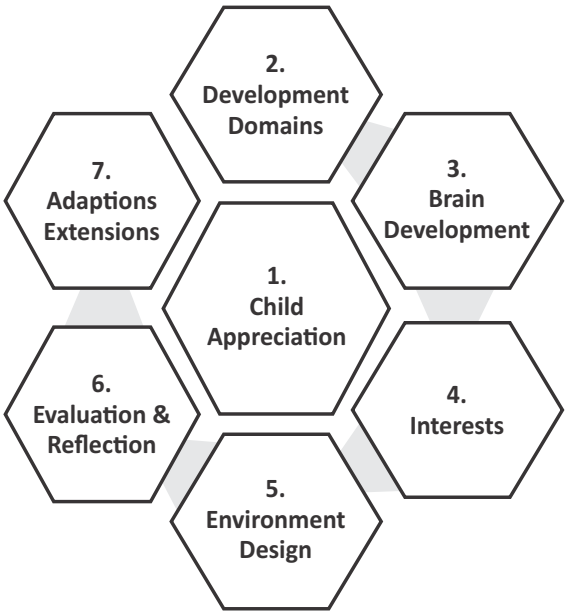

Figure: 3 The Brain-SET Planning Overview.
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needed in the environment.

The full Brain-SET planning template guides teachers to plan effectively and with confidence. Using the template areas, teachers are satisfying the developmental needs of the child, and curriculum requirements, while designing effective and interesting, play-based learning spaces. Careful planning that allows room for flexibility and spontaneous teaching offers children the opportunity to enjoy a playful and committed childhood.

CONCLUSION

Let's recall all that has been presented so far.

- The need for revolutionary change in education is necessary as we build on the industrial or factory model of the 1800s.
- Research-based practice is necessary to ensure we utilise the wisdom of those who have gone before us with the addition of neuroscience and extensive experience.
- Including what we know about neuroscience is integral when planning learning environments and facilitating children's growth and development.
- Building relationships in an environment that

feels safe and connects emotionally allows thinking and exploration of learning to occur naturally and authentically.

- Utilising our understanding of the three levels of the brain guides us to implement three Pillars of Design and 16 Elements of Design to create a calm and engaged classroom and implement an effective early childhood pedagogy.

Teaching can be a complex process, with many facets. It can be stressful and overwhelming at times. Teaching can also be exciting, satisfying and joyful. Using the Brain-SET pedagogy allows teachers time to reflect and deepen relationships with children and between colleagues. Behaviour issues decrease, and opportunities for oral language increase, along with resilience, problem-solving, communication, cooperation, collaboration, and respect for others and the environment. Above all the learning environment gives children the space to be children and experience a rich, playful childhood. Let's aim to ensure that we stick to the mantra of "A Calm Brain is a Thinking Brain"!

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