

STEM Bridge research project

Bridging the learning: inside and out



STEM
EARLY YEARS

INTRODUCTION

In 2018, educators from Port Pirie West Children's Centre and Port Pirie West School participated in the **STEM Bridge** project, researching the practices that support children's STEM learning as they transition from preschool to school. The project gave teachers the opportunity to dialogue, document, reflect and report on the environments and the materials that most effectively support children to continue to learn through play. The results from Port Pirie's research highlight the importance of rich, open-ended outdoor areas for exploratory play, the benefits of repeated visits to such an area for learning, the role of the teacher in facilitating exploratory play and the curriculum documents that support teachers to design and assess for learning in a play-based environment.

BACKGROUND

Transition to school has long been a challenge for teachers and children. Therefore the initial phase of the research saw educators and leaders from both sites coming together to elicit their initial thinking and identify potential challenges and opportunities. At the outset of the research, teachers observed some students had difficulty settling into the structured, mostly indoor school setting, which impacted on their engagement and learning. They wondered if STEM was a useful context for supporting these learners to transition from preschool into the foundation year of school.

Together, the two groups of teachers explored the Early Years Learning Framework (EYLF), the Australian Curriculum (AC) and pedagogical approaches through the lens of STEM. The preschool educators spoke of their cycle of planning and of their existing practice of 'noticing' and documenting stories of the powerful STEM learning at their site. The school teachers noticed that STEM learning in preschool occurred through exploratory play, in both indoor and outdoor spaces. They also saw that play-based learning environments gave children agency and opportunities to identify and solve authentic problems in collaboration with others.

THE RESEARCH

Through the initial collaborative discussions, the school teachers identified two research questions to investigate. Firstly, how could their school space, in particular the outdoor areas, support STEM learning through exploratory play? And secondly, how could they plan for, document and assess students' learning during such play and still meet the requirements set out in the curriculum?

The teachers realised that the large outdoor area at the school, despite its size, did not provide the richness of material to use in exploratory play that they had noted at the preschool. With limited funds for improving this area, teachers decided to set aside an outdoor space near the children's centre and fill an existing storage shed with 'loose parts'¹ for the students to access and explore during their play.



¹ www.playaustralia.org.au/sites/default/files/LibraryDownloads/loose-parts-toolkit.pdf



To approach the problem of how to assess exploratory play, school teachers sat down with preschool educators to explore their documentation process. They worked through the EYLF and the AC and noticed that the Critical and Creative Thinking (CCT) learning continuum² could be used as a lens for documentation and assessment of the students' STEM thinking.

Educators and children from both sites met in the school space to engage in outdoor STEM learning together. All educators had a role to play in documenting the learning. They met regularly to collaboratively reflect on their documentation. They noticed relatively low levels of engagement by the preschool children but high levels of engagement by the reception students. This suggested that the existing preschool environment was sufficient to support children's STEM play, but that the new outdoor school space and materials represented a significant learning shift for the reception students, one that ignited interest and sustained engagement to support their natural curiosity and critical and creative thinking.

Together, the teachers decided that the school would continue to explore STEM learning in the outdoor space and that the preschool children would continue to engage in their learning in their existing preschool environment. All educators made a commitment to continue to meet regularly to document, reflect and evaluate the impact of the environment and the materials on the children's learning.

The reception students continued to visit the outdoor space for exploratory play, and over time the teacher saw that the students were working with the loose parts more intentionally, to design, identify and solve problems. The teacher worked alongside the students, responding to their questions and wonderings, relaunching these as new investigations.



² <https://www.australiancurriculum.edu.au/media/1072/general-capabilities-creative-and-critical-thinking-learning-continuum.pdf>



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THE FINDINGS

During the outdoor STEM exploratory play sessions, all educators noticed that:

- students demonstrated skills and abilities that were not visible in the indoor classroom setting (eg collaboration, critical and creative thinking, problem solving)
- students worked collaboratively to set challenges and identify authentic problems and then designed solutions to them
- there was a change in learning dispositions compared to 'indoor' environments; students felt 'in charge' and empowered by the outdoor environment and were more willing to lead their own learning rather than relying on educator input
- the environment and materials served as provocations for the students, giving them a framework for posing and solving their own problems.

The educators found that, for a relatively low cost, loose part exploratory play can be successfully implemented in an outdoor school environment to support the continuity of STEM learning from preschool to school and, from the indoors to the outdoors. The research also revealed the importance of revisiting the outdoor space, as repeated visits

gave students the chance to be more intentional in their play-based approach and helped surface students' new thinking and dispositions for teacher documentation.

The educators also found that the learning opportunities in STEM exploratory play can be integrated with curriculum requirements. Supported by the collaboration with the preschool, the reception teacher's practice of noticing, documenting, questioning and reflecting alongside students enabled her to make connections to not only the CCT but also to other learning areas of the AC, including Literacy, Numeracy, Science and the General Capabilities. Consequently, she documented and assessed the learning from the STEM exploratory play with evidence of the students' ability to explore, pose questions, organise and process information, generate ideas, consider alternatives, imagine possibilities, identify and seek solutions, evaluate procedures and draw conclusions. In addition, identifying and being able to plan for learning opportunities in STEM play deepened the teacher's understanding of how and where students learn.

