



Disciplined innovation: STEM Nature Play Project

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Last year was a year of inspiring joy in learning at Jolimont Primary School. School leaders recognised a need for our students to have a strong foundation in critical and creative thinking skills for innovation and problem solving. To bridge the gap between research and application of 21st Century learning in the fields of STEM (Science, Technology, Engineering and Mathematics), we investigated and introduced a 'spiral of inquiry' (Halbert & Kaser 2017) model through learning sprints (Breakspear 2016) using the '5E instructional model' (Bybee et al. 2006). We planned a STEM: Nature Play Project in response to a school and community passion for imaginative play, which enhances physical, cognitive and mental health and wellbeing (Steglin 2005). Partnerships between our school leadership team, staff, students, parents and the wider community resulted in a program of learning that engaged students in purposeful, challenging and rich STEM tasks that brought learning to life.

Vision

As a result of parent workshops and consultation on risk play and playful learning spaces, a member of the school community supplied the school with a roll of fire hose for use in the school plans to provide Nature Play spaces. The Associate Principal met with the Year 4 to 6 teaching team to 'think tank' how Jolimont could implement a STEM project that linked broader school directions. School leaders recognised the importance of time and planning to the project's success and released teaching staff to plan collaboratively. Ideas bubbled and excitement for the project grew as the days progressed. Teachers studied the Western Australian School Curriculum and Standards Authority (SCSA) documents in English, Mathematics, Science and Technologies and analysed assessment outcomes across the Year 4 to 6 judging standards (SCSA 2014) and, finally, crafted the logistical elements of the project including timetabling, multi-age group structures and identifying individual staff strengths and responsibilities.



The STEM: Nature Play Project was thoughtfully constructed to meet the needs of teachers, learners, content, resources and pedagogy. Innovative aspects included the multi-age groupings and rich tasks linked to project-based learning, which provided opportunities for interdisciplinary, deep learning experiences. A key characteristic was teacher collaboration as a professional learning team (DuFour et al. 2010). This was evident in an ongoing commitment of the team to meet weekly to engage in 'co-planning, co-teaching and co-assessing' (Organisation for Economic Cooperation and Development [OECD] 2013, p. 164).

Engage

To build the capacity of our students as 21st Century learners we designed collaborative tasks that encouraged students to develop skills of adaptability, communication, non-routine problem solving, self-management and systems thinking (Bybee 2009). The students were highly engaged for two afternoons a week in learning sprints to plan a play structure. For the children to familiarise themselves with the material, a key activity was fire hose play. Opportunities for students to purposefully play with design, engineering and construction were created in the Senior Learning Area, which was converted into a 'MakerSpace'. To broaden student perspectives and deepen their understanding of key learning elements of the project, community guest speakers were invited to share with the students their areas of expertise. The first speaker was Only One Ashley fashion designer, Kate Watts, whose story inspired students to be resilient and persistent in making their dreams a reality. The second speaker was journalist, Ngaire McDiarmid, who enlightened the students on the 'tricks of the trade' in being persuasive with written communication. The third speaker was Andrew Reedy from Playcheck, who gave a visual presentation on risk and safety and how to build a safe, but challenging Nature Play item.

Explore

Exploration of the learning was the next phase in the STEM: Nature Play Project. Teachers prepared hands on STEM challenges that utilised instructional strategies that engaged students during group rotations, with a focus on learning to collaborate towards a shared outcome. Activities included: Who can build the tallest tower using 12 straws? How slowly can you make a ping pong ball roll? Invent a device that launches a pom pom into the air. Can you sink a plastic bottle without filling it with water? The teachers presented the children with the learning intentions and success criteria to cue students into the purpose of the learning. They set the inquiry question and worked with students to understand the restraints of the task, including materials and a budget. Once students had a clear understanding of the inquiry question, they began to collaborate in their multi-age teams to identify survey questions. The Year 4 to 6 students consulted with Kindergarten to Year 3 students about what features they would find exciting in playground equipment. This process engaged the whole school community and highlighted the significance of the project the students were embarking on. The teachers took on the role of learning facilitators or teacher 'engagers' and co-learners with students.

Explain

Through a curriculum design process, the spiral of inquiry and utilising learning sprints, teachers planned 'deep dive' units of work that supported the students in their rich task of designing an item of Nature Play equipment. These curriculum links included Mathematics understandings around units of measurement, scale and ratio, mass, angles, 3D and 2D shapes and technical drawing skills. In Science, learning involved knowledge and understanding of physics principles and forces. Literacy skills were enhanced through learning sprints, including crafting newspaper articles, persuasive



texts, blog writing, journal writing, procedure writing and survey question design. This was underpinned by purposeful integration of technology to engage students, deepen their understanding and apply digital technology skills to research, plan and present their learning.

Elaborate

In the elaboration phase of learning, students worked in collaborative, multi-aged teams to share ideas and complete a scaled drawing. Students had to consider design constraints around safety and materials, and form clear concepts about how they would incorporate the use of the fire hose into their Nature Play structures. The focus on collaborative group skills was essential and many lessons involved learning about how to work best alongside others. Reflections on the successes and challenges of doing so featured heavily in student reflections, with teachers coaching students through this valuable life experience. Collaboratively, students completed a scaled drawing and a persuasive poster explaining the elements of design. Finally, student groups built their 3D model to share with the school community.

Evaluate

A significant aspect of the STEM: Nature Play Project was the rich task of the students designing an item of playground equipment that would be a feature of the school. Whole school engagement and consultation featured heavily, giving a 'real world' context for students. Teams of students set up an 'expo' of their ideas that included their models, 3D drawings, newspaper articles and persuasive posters. To include the whole school in the process, Kindergarten to Year 3 students then voted on which design they liked the best. As part of the students' reflective process, teachers designed a general capabilities assessment task that asked students to complete an individual self-assessment and reflect on whether their communication, collaboration, decision making and negotiating skills were effective. In their teams, students also completed a reflection to identify 'what worked well' and what would be 'even better if...?'

The final phase was the construction of the Nature Play equipment. The Principal, Barbara Iffla, advocates for playful learning spaces, and to this end commissioned architectural drawings. These were inspected by Andrew Reedy from Playcheck, to ensure safety standard compliance. Ben Sutherland from Play Fix WA was funded by the Parents & Citizens Association to complete the build. This ensured the play equipment, incorporating the use of the fire hose, has become a permanent fixture of the school grounds.

Reflect

Leadership of innovation goes beyond the usual traditional approaches to thinking, strategic change and management. A key characteristic of the STEM: Nature Play disciplined innovation is the nurturing of leadership skills of all members of the senior professional learning team. 'Leadership models need to be focused on ... being involved in serious play and generating insights through experimentation' (OECD 2013, p. 169). The senior team was legitimately involved in 'rule bending' or experimenting with disciplined innovation. Building a positive culture based on creative problem solving in project-based learning has been an invigorating experience for students, teachers and, myself, as a school leader. We are proud of the Jolimont approach to meeting our students' needs as 21st Century learners, both now and into the future.

References

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