

Early Childhood Resource Hub newsletter

STEM focus

In this newsletter there is a strong focus on the 'T' part of STEM: Technology. Read how one service is working with unplugged and coding activities. Find some useful resources for learning activities in maths, science, engineering and technologies. Discuss some new ideas at your next staff meeting. Plan for Science Week, 11–19 August 2018.

Case study: STEM

'It doesn't matter if it fails as that's how you learn.'

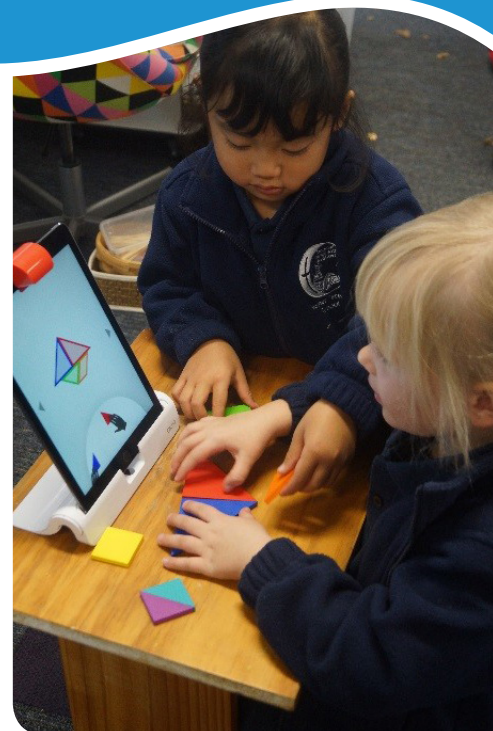
Janene Sadler is currently a Lead Educator of a full-time class at Mother Teresa Early Learning Centre in Harrison, ACT. She is also the ICT Coordinator. Over seven years she has had the privilege of working with the dedicated educators at the Mother Teresa ELC to develop a STEM program specific to that service. The service is developing a sustained focus on digital technologies. Here, she describes the journey that they have been on.

How does your service approach the area of STEM in terms of your education program?

We are very open to the STEM approach and relish the opportunities to see what is new and exciting in this area through professional learning and discussions. We have a play-based curriculum, which allows children to investigate, explore and question the world around them. This is the perfect environment within which to engage with STEM. We are fully connected with our primary school and this is reflected in our program, as we engage with many aspects of school life, alongside developing our nature-based risk-taking philosophy in the form of nature walks, working with and cooking on fire and developing our risk-assessment skills, climbing trees and using tools. Therefore, we have to be very innovative and creative with how we incorporate STEM each day.

What types of activities have been effective in working with children?

I have developed a framework for technology that is specifically designed for our centre and which caters for both full-time and the part-time classes. It is broken down into terms, and educators can pick and choose what suits their individual programs. This allows them to explore at their own pace and extend on their own interests. Our centre uses coding, in many forms, starting with unplugged, then introducing apps, writing code and then using beebots. Breaking the process into steps and using it creatively engages children and creates a hype that keeps them coming back and wanting more.



Using the OSMO tangram



BeeBot play

Your service uses 'flipped learning' as a teaching strategy; can you describe how this works?

Flipped learning is a new strategy that our centre is exploring following professional learning. This is something that we had to modify to suit our style of teaching. We make open-ended instructional videos for the children to use. They are able to access the iPad, watch the video and then carry out the activity, replaying the video if needed. These activities can be done without educators, freeing up educators to observe and watch the children.



What has enabled the focus on STEM to grow?

The focus on STEM has grown within the centre, through my passion for technology and also the enthusiasm of all educators 'to give it a go'. It doesn't matter if it fails as that's how you learn. I have also been able to build a support group of like-minded people with the ICT coordinator in the primary school.

How have families responded to the STEM focus?

The families have responded positively to our STEM program and some of them can't believe the types of things we do in preschool. They have asked for the names of programs and products we use so they can use them at home.

Have you encountered any challenges in working with STEM as a focus?

Helping other educators is important to keeping STEM alive, and we have weekly staff meetings where we can ask questions or share ideas. I have one day off a term to support the use of technology within the centre. We keep parents up to date through Google plus and at the start of the year during our information evening we were able to inform parents regarding our STEM program.

There are always problems when working with technology. The main one is that it sometimes just doesn't work, but having a backup plan is helpful. Money is another issue: setting up kits can be a costly process and a time-consuming one as well. We are in the process of looking into starting a lending library with other centres in our organisation. This will help bring costs down and provide access to a larger array of technologies.

This project is still in its infancy but will hopefully come to fruition later this year. This will allow more children access to different technologies. I have come across a few challenges, particularly finding professional learning aimed for the younger years; I currently attend sessions aimed at primary schools and then modify what I have learnt to make it work in our centre. Time is another challenge that we face, especially for the part-time classes. Trying to fit everything into a few days can be hard.

What are some resources that other educators could use, either to improve their own understandings or in working with children?

There are many resources available to support STEM, but we are always looking for creative ways to develop the children's thinking. Our centre starts first with unplugged coding and we introduce the iPad to the children on how to take photos. This enables them to document their own learning. The iPad is attached to the wall, along with their names, the children can then grab their name and iPad and take a photo of their construction, puzzle or whatever they want to put in their learning journal. At the end of the day we can print from the iPad and put the photo straight into their learning journal with a blurb of why they took that photo.



Some unplugged coding using the floor squares

Other forms of technology we use are beebots, makey makey, robotics, solar power kits, OSMO varieties, along with science investigations.

These activities help children with their thinking and creative processes. They can be used in whole group, small group or individual experiences.

What tips/advice would you have for other educators interested in STEM?

My advice for you all is to not be scared to give it a go, the children love it when things don't work. They even help to fix the problems. Put a plan together, make a list of what interests you, start networking with some people around you and see what professional development is out there.

For team discussion

Early Learning in STEM: Multimodal learning in the 21st century project report – This report investigated the range of useful STEM education apps that were available for early learning in the preschool year (4–5 years of age) in 2016. Apps were grouped and analysed within five areas: skills-based apps, exploratory games-based apps, construction and experimentation apps, interactive apps and creative and open-ended apps.

Early childhood STEM pedagogy and practices – This PPT captures a 2017 research project with Victorian educators investigating emerging forms of pedagogy and learning dispositions in early childhood STEM. It includes useful rubrics that educators could use to measure the extent of their understanding and implementation of STEM in their services.

How Singapore is introducing coding to early learners – In 2015, Singapore launched a program called Playmaker, in which preschools were given four toys designed to boost children's interest in STEM, in particular to develop digital technologies skills.

Talking STEM: Inquiry questioning in early childhood education – This article examines a research project exploring the ways in which open-ended questions can be used effectively with STEM activities such as 'Help – I forgot my hat!'

Making bubbles: Scientific research in early childhood settings – This article describes the Little Scientists program and learning opportunities afforded by a focus on science. Find out more about Little Scientists.

Early Learning STEM Australia (ELSA) – This is a play-based digital learning program for children in preschool to explore science, technology, engineering and mathematics (STEM) practices. One hundred preschool services from across Australia are taking part in the 2018 ELSA pilot. The first app is about patterns and relationships.



Resources

STEM in Early Childhood: How to keep it simple and fun – This PPT by Dr Pauline Roberts of Edith Cowan University provides a definition of STEM activities, a rationale for STEM in the early years and some useful links and ideas.

Five things parents can do every day to help develop STEM skills from a young age – In addition to developing early literacy skills, parents and early years educators can also encourage early STEM (science, technology, engineering and mathematics) skills. This article has five strategies that support this focus.

Ten science experiments for toddlers – Provide rich experiences that show how the world works just by targeting sight, hearing, smell, touch and taste. Beyond looking at the five senses, consider how you can teach toddlers about simple science such as pull and push / float and sink / hot and cold.



Water jar xylophone – this science experiment at Kids Resort Early Learning Centre teaches the children how sound changes depending on the volume of water in each jar

Northern Territory Preschool Maths Games –

These games are designed to be fun for children and easy to use for teachers. They focus on encouraging active participation, mathematical thinking and reasoning, and back-and-forth conversations.

Taking Small BYTES card deck –

This resource showcases learning opportunities built around digital technologies and other play-based learning experiences.

Daisy the Dinosaur jumps for computer coding

Introduce the children to giving and understanding simple instructions – it's the basis of computer coding. In a few easy steps, Daisy can be programmed to jump, roll and turn. Find Daisy at FUSE: fuse.education.vic.gov.au/?WJWZC2

Follow-up learning experiences

- Play games that reinforce following instructions such as Ship-Shark-Shore.
- Talk about recipes that logically follow a sequence of steps, such as making a sandwich.
- Ask the children: What happens when we don't follow instructions or rules properly? Can we get lost? Will the play dough work if we don't follow the recipe?
- With the children, make play dough, following a recipe. Take photos at each step and share with parents.

VEYLDF connections

Principle

Integrated teaching and learning – children learn through exploring, experimenting, investigation and being creative.

Outcome

Children are effective communicators – children interact verbally and non-verbally with others for a range of purposes.

Learning Experience

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