

# STEM in Early Childhood: How to keep it simple and fun

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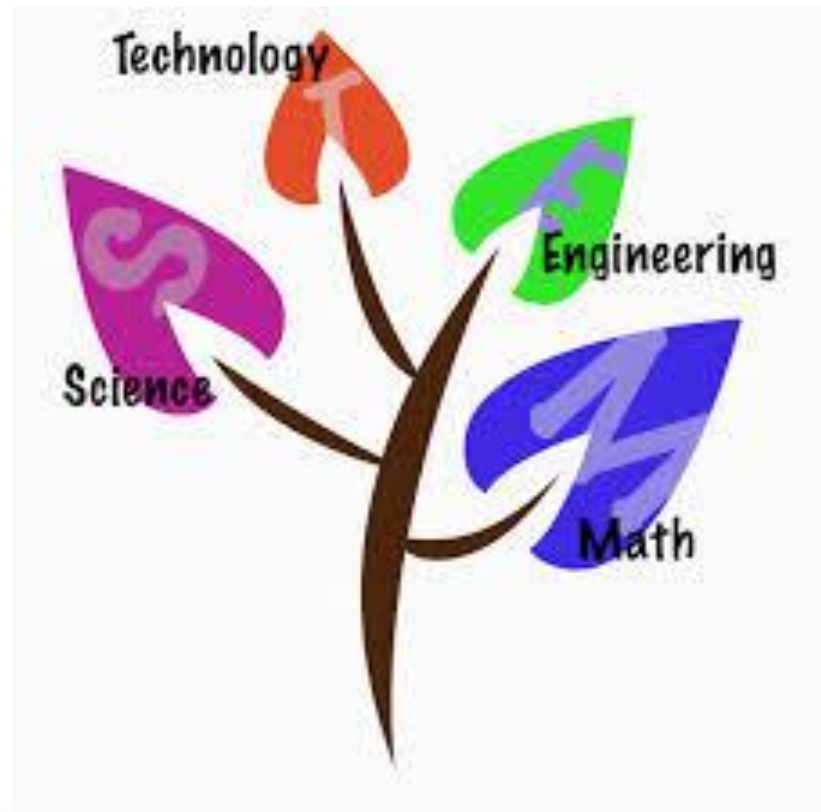
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# What is STEM?

## or STEAM or METALS

- **A** adds Art
- **L** adds Literacy
- Refers to the **integration** of at least 2 curriculum areas



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# What is STEM?

## STEM Philosophy

“STEM is a way of thinking about how educators at all levels - including parents - should be helping students integrate knowledge across disciplines, encouraging them to think in a more connected and holistic way”

(Sneideman, 2013)



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# Why the focus on STEM?

## STEM is everywhere – what's with that???

- Strength in the STEM disciplines has been linked to economic prosperity of developed countries
- In Australia, the results in standardised testing in some of these disciplines has not improved since 1995 (Thomson, Hillman, Wernert, Schmid, Buckley & Munene, 2012).
- Less students are doing Maths/Science in Senior High School – particularly girls



# Why STEM in Early Childhood?

## **Because integration is what we do best**

- The focus in ECE is on the whole child
- EC Educators understand that learning doesn't happen in silos

## **Because hands-on learning is our focus**

- Following children's interests is at the core of our planning
- Engagement with the activities to construct knowledge is what we do

## **Because positive dispositions are what we develop**

- Children in the early years develop long-term habits of learning



# Positive attitudes

## We need to keep the FUN in these learning areas

- A large proportion of people do not like maths or science and this is because of negative experiences in schooling
- Many people do not realise how much of our lives incorporate these discipline areas
- Children are naturally curious yet this is often dampened through overly structured approaches



# Foundation knowledge and skills

## **Its not only about the product, but the process**

- Many of the skills of inquiry can be developed very early in children's development
  - Questioning
  - Observing
  - Communicating
- The language of science is important to learn in context



# Problem: Lack of confidence

## **EC educators are not confident with these learning areas to develop children's knowledge**

- Much of the research, particularly in science, has found that Early Childhood Educators are not confident to teach science
- Unsure of how to plan and extend children's understanding
- Unsure of the content themselves when asked questions





# Problem: Missed opportunities

## Children do **STEM EVERYDAY!!!**

- There is still a perception that to do science, there needs to be big experiments and lots of equipment
- Being open to children's questions allows for STEM concepts to be developed in everyday interactions
- Making the links explicit to the children also lets them understand the 'work' they are doing



# Exploring STEM Practices and Concepts in the Early Childhood Classroom



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<https://www.youtube.com/watch?v=HglYz0h2n2E&feature=youtu.be>

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# Inquiry Based Learning

- Child is **constructor** of their own knowledge (Constructivist approach)
- Follows children's **interests**
- Engages children in '**active**' learning
- Fosters **deep** learning
- Children engage with a question or problem over a period of **time**



# The Project Approach

## Phase 1:

- Starting the Project
- Questions, word web

## Phase 2

- Investigate & Present
- Real objects, more questions

## Phase 3

- Presenting and sharing
- Communication & conclusion

- A teaching strategy to engage children in an in-depth study of a topic of real world investigations.
- Can be with one child, a few children or a whole class project
- In Reggio they use the term *progettazione* translated as the project approach



# Children's voices

## All children can be involved with telling their story of the inquiry

- Conversations, written stories and webs
- Using a variety of media: drawing, painting, sculpture, diorama, models
- Writing captions and signs
- In constructions and play environments
- Drama and musical expressions



# Some ideas to implement

## Birth - 3

Musical instruments

Mirrors

Light boxes and Perspex shapes

Playdough

Blocks – different materials and types

Wheeled vehicles

Growing things

Playdough

Wooden blocks and plastic animals / shapes

Large foam blocks outdoors

Sand and water wheels

Materials for sorting and classifying



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# Some ideas to implement

## 3-5 Year olds

Bubble printing

Ramp rolling

Water walls

Houses for pigs (or other fairy tale themes)

Gardening projects

Bridge building



[blogs.brighthorizons.com](http://blogs.brighthorizons.com)



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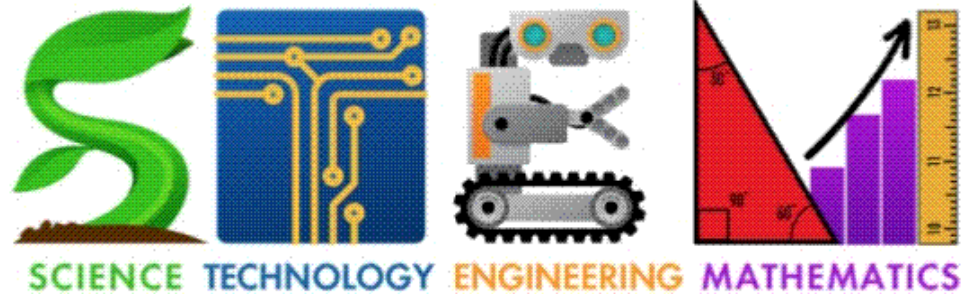
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# Some ideas to implement

## 5-8 Year olds

Nature prints  
Bee Bot city crossing  
Real-word problems  
Vegetable garden  
Water collection  
systems



<http://www.dentonisd.org/Page/78955>



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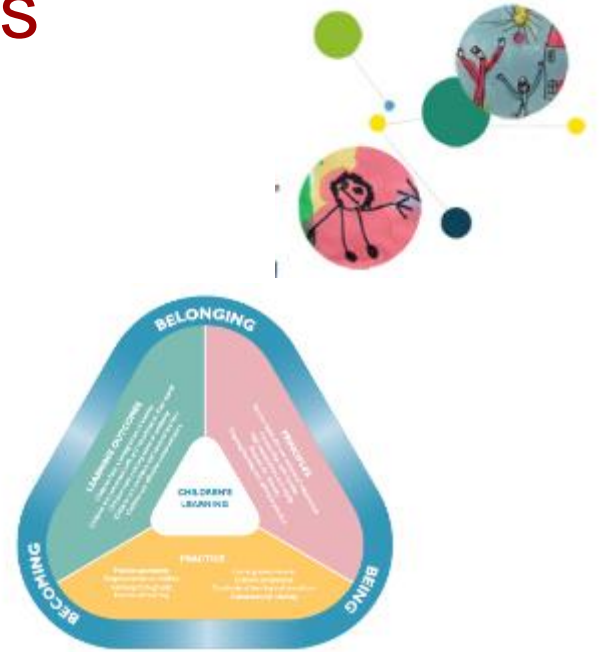


<b>Cooking</b>	<b>Blocks</b>	<b>Sensory</b>	<b>Art</b>	<b>Music</b>
<ul style="list-style-type: none"> <li>* Source of ingredients</li> <li>* Measuring</li> <li>* Machines for the process</li> <li>* Chemical changes to ingredients</li> </ul>	<ul style="list-style-type: none"> <li>* Design of structures</li> <li>* Engineering for stability</li> <li>* Inclines and simple machines</li> <li>* Geometry</li> <li>* Measurement via direct comparison</li> </ul>	<ul style="list-style-type: none"> <li>* Properties of materials</li> <li>* Displacement</li> <li>* Simple machines – funnels, sand wheels</li> <li>* Categorising grouping and patterns</li> </ul>	<ul style="list-style-type: none"> <li>* Use of natural materials in paints, sculpture and collage</li> <li>* Properties of materials and mixing</li> <li>* Symmetry and patterns</li> </ul>	<ul style="list-style-type: none"> <li>* Vibrations and sound waves</li> <li>* Loud and soft</li> <li>* Measurement</li> <li>* Counting</li> </ul>



# Links to curriculum documents

- EYLF
- KINDY guidelines
- ACARA
- SCSA



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# Want to know more???

Aitken, J., Hunt, J., Roy, E., & Jafar, B. (2012). *A Sense of Wonder: Science in Early Childhood Education*. Albert Park, Australia: Teaching Solutions Australia.

Howitt, C. & Blake, E. (Eds.) (2010). *Planting the Seeds of Science: a flexible, integrated and engaging resource for teachers of 3 to 8 year olds*. 2<sup>nd</sup> ed. Available from: [www.asta.edu.au/generic/file-widget/download/id/171](http://www.asta.edu.au/generic/file-widget/download/id/171)

Knaus, M. (2015). *Maths is all around you: Developing mathematical concepts in the early years*. Albert Park, Australia: Teaching Solutions Australia.

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# And more???

## Useful websites

- STEM Works <http://stem-works.com/>
- Illinois Projects in Practice <http://illinoisearlylearning.org/illinoispip/guides/trees.html>
- STEM teaching tools <http://stemteachingtools.org/>
- Restoring the focus on STEM in schools initiative  
<https://www.studentsfirst.gov.au/restoring-focus-stem-schools-initiative>
- STEM clubs activity list <http://www.stemclubs.net/activity-categories/>
- 40 STEM activities <http://www.playdoughtoplato.com/stem-activities-for-kids/>
- STEM works UK <http://www.stemworks.co.uk/>



# Questions and comments...



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- Moomaw, S. (2013) *Teaching STEM in Preschool and Kindergarten: Activities for intergrading Science, Technology, Engineering, and Mathematics*. St Paul, MN: Redleaf Press
- Office of the Chief Scientist. (2013). *Science, Technology, Engineering and Mathematics in the National Interest: A strategic Approach* (Position Paper). Canberra: Australian Government.
- Sneideman, J.M. (2013) *Engaging children in STEM education EARLY!* from <http://naturalstart.org/feature-stories/engaging-children-stem-education-early>
- Thomson, S., Hillman, K., Wernert, N., Schmid, M., Buckley, S., & Munene, A. (2012). *Highlights from TIMSS & PIRLS 2011 from Australia's perspective*. Melbourne: Australian Council for Education Research (ACER).

