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

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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
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)
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

It's 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

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

- 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

<table>
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<tr>
<th>Musical instruments</th>
<th>Growing things</th>
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<tbody>
<tr>
<td>Mirrors</td>
<td>Playdough</td>
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<tr>
<td>Light boxes and Perspex shapes</td>
<td>Wooden blocks and plastic animals / shapes</td>
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<tr>
<td>Playdough</td>
<td>Large foam blocks outdoors</td>
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<tr>
<td>Blocks – different materials and types</td>
<td>Sand and water wheels</td>
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<tr>
<td>Wheeled vehicles</td>
<td>Materials for sorting and classifying</td>
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</tbody>
</table>
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
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
<table>
<thead>
<tr>
<th>Cooking</th>
<th>Blocks</th>
<th>Sensory</th>
<th>Art</th>
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<tr>
<td>* Source of ingredients</td>
<td>* Design of structures</td>
<td>* Properties of materials</td>
<td>* Use of natural materials in paints,</td>
<td>* Vibrations and sound</td>
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<td>* Measuring</td>
<td>* Engineering for stability</td>
<td>* Displacement</td>
<td>sculpture and collage</td>
<td>waves</td>
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<tr>
<td>* Machines for the process</td>
<td>* Inclines and simple machines</td>
<td>* Simple machines – funnels, sand wheels</td>
<td>* Properties of materials and mixing</td>
<td>* Loud and soft</td>
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<tr>
<td>* Chemical changes to ingredients</td>
<td>* Geometry</td>
<td>* Categorising grouping and patterns</td>
<td>* Symmetry and patterns</td>
<td>* Measurement</td>
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<td></td>
<td>* Measurement via direct comparison</td>
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<td>* Counting</td>
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</table>

* Properties of materials
* Displacement
* Simple machines – funnels, sand wheels
* Categorising grouping and patterns
* Use of natural materials in paints, sculpture and collage
* Properties of materials and mixing
* Symmetry and patterns
* Vibrations and sound waves
* Loud and soft
* Measurement
* Counting
Links to curriculum documents

- EYLF
- KINDY guidelines
- ACARA
- SCSA
Want to know more???


And more???

Useful websites

- STEM Works [http://stem-works.com/]
- 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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References


