‘Meaningful Maths : Learning through Physical Play’

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Influences!

- The **first** issue that really impacts on our mathematical provision goes back to the 17th Century 'Rationalist' movement – particularly the work of Rene Descartes. His bringing together through a 'co ordinate system' the worlds of geometry and arithmetic was revolutionary – but what concerns us most is his absolute rejection of 'the body' as playing any meaningful role in any area of learning
- The **second** issue that affects us directly is the legacy of the Industrial Revolution in the 18th Century - specifically the emergence of state funded schools that were created to cater for a growing workforce

What have we lost along the way? Considering the main area of job growth lies in computer graphics, engineering and medical imagery – are we really giving children the skills needed? The interfaces to access information are shifting quickly from the alphanumeric to the spatial - quantitative (arithmetic/computation) and qualitative (geometric/spatial) domains are merging to form new areas of knowledge.



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Supporting mathematical thinking – emergence of 'Spatial Reasoning'

- Three 'powers' are involved in working with space : Tahta (1989) – (spatial reasoning was not a phrase used at this point) – but these 'powers' provide a useful means to focus on the interplay of practices
- Imagining (seeing what is said)
- Construing (seeing what is drawn – saying what is seen)
- Figuring (drawing what is seen)

- This has been expanded by the Spatial Reasoning Study Group (SRSG) since 2012 to include the following 'dynamic processes.'
  - Locating
  - Orienting
  - Decomposing/recomposing
  - Shifting dimensions
  - Balancing
  - Diagramming
  - Symmetrizing
  - Navigating
  - Transforming
  - Comparing
  - Scaling
  - Sensing
  - Visualising

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How may the SIX principles of a movement approach to learning support 'spatial reasoning'?

Start where children are

- Understand, appreciate – and VALUE the wealth of experiential mathematical knowledge and spatial reasoning that children acquire through daily

Use of Immediate Environment

- The 'Immediate Environment' in movement terms is a) the individual/physical body b) the group c) the physical environment

Hand Apparatus

- Must be easily accessible/free – known to children – not sports oriented or commercial



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How may the SIX principles of a movement approach to learning support 'spatial reasoning'?

Music and rhythm

- 'Steady Beat' competence important – another good predictor of future school performance. Develop : anticipation/memory/ mirroring/patterning/timing/sequencing

Group work

- Important element in developing spatial reasoning – collaboration/ problem solving/delegating/decision making – discussion : (how/ why/if/when/perhaps/probable/possible)
- Games : connect 4/drafts/dice/cards/board games

Transfer of skills

- Understand, appreciate and value the place of spatial reasoning in children's lives – how the provision for this can affect their future confidence in maths generally

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Conclusios

Conclusions

- Physical Development is a 'Prime Area' of the EYFSC for a very good reason. As an 'experience expectant' area of learning it supports, informs and underpins the 'experience dependent'/ Specific area of mathematics
- We must find new and creative ways of bringing the two closer together – placing the body centre stage as a critical conduit by which learning and understanding is assured
- We need to ensure young children have the confidence and competence to use mathematical concepts freely and imaginatively – without having to prove anything on paper – or to continually repeat 'numbers' for no good reason.
- Spatial reasoning is a very new research field that is changing and evolving all the time – although it is looking back to an area of knowledge that played a central role in learning until the mid 19th Century. We need to build on the mathematical knowledge children bring with them to our settings – and be far more aware of what they are taking away and how it may be used most effectively.
- 'Mathematics has beauty and romance – it's not a boring place to be the mathematical world – it's an extraordinary place – it's worth spending time there.'

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