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Tinker Tailor Robot Pi

Royal Academy of Engineering Dissemination Event

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Dr Lynne Bianchi

Head of the Science & Engineering Education Research and Innovation Hub,

The University of Manchester

@UoMSEERIH

COMINO FOUNDATION

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Science & Engineering Education Research and Innovation Hub

- **Engaging in-service primary & secondary teachers with innovative CPD opportunities** aimed at enriching mainstream science & engineering teaching, learning and assessment.

- **Enhancing the interaction between the University of Manchester's academics and students with schools in Greater Manchester** aimed at informing teaching and learning for all.

- **Stimulating discussion and debate about excellence in primary science and engineering education across the education sector** aimed at forging effective and critical collaborations.

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How do we embrace engineering education and an ethos of tinkering using computer science, design technology and the science curriculum?

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TTRP worked with a cluster of 8 primary and secondary schools, academics/students from the Faculty of Engineering & Physical Sciences and specialists to:

- share professional practice and knowledge to provide greater insight into the school science, DT and computer science curriculum, and the related teaching and learning opportunities schools exploit in their delivery. **What is currently happening in schools?**
- explore how engineers ‘work’ by deconstructing how engineers practice their profession. **What it means to ‘be’ an engineer?**
- identify areas within the curriculum (science, DT and computer science) that would allow for a stronger ethos engineering to be embraced. **Where are the opportunities?**
- use coteaching to develop, deliver and reflect on learning opportunities for pupils which are infused with the skills, habits of minds and processes of engineering within the context of the science, D&T and/or computer science **What can we achieve together?**

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engineering education

engineering Habits of Mind

Test bed – Making science more scientific using technology

Test bed – Making computer science more integral to learning in science & DT

Test bed – plugging the gaps in the control and challenge elements of computer science

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What would success look like if we get engineering education right in schools?

Students willing to have a go and learn from ‘mistakes’, to adapt to progress forward, be creative and enjoy and achieve in the subject. (Lisa Croston, St Mary’s RC Primary, Swinton)

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How do you cultivate a habit of mind? –
A reverse-engineered Approach

1. Understand it [its components and what it looks like when students do it]
2. Create the climate for it [be a role model, displays, use language which encourages it, notice it, reward it]
3. Teach it (1) [choose pedagogies, materials, visitors, visits likely to encourage it]
4. Teach it (2) [split screen – subject + habit]
5. Build learner engagement [pupils own it]

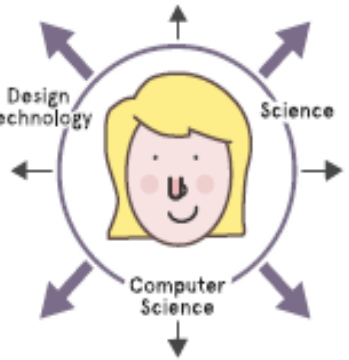
TINKERING

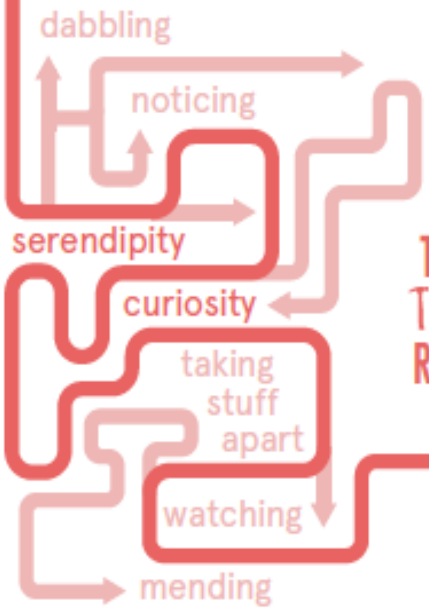
A SIGNATURE PEDAGOGY FOR PRIMARY ENGINEERING

TEACHING THROUGH TINKERING

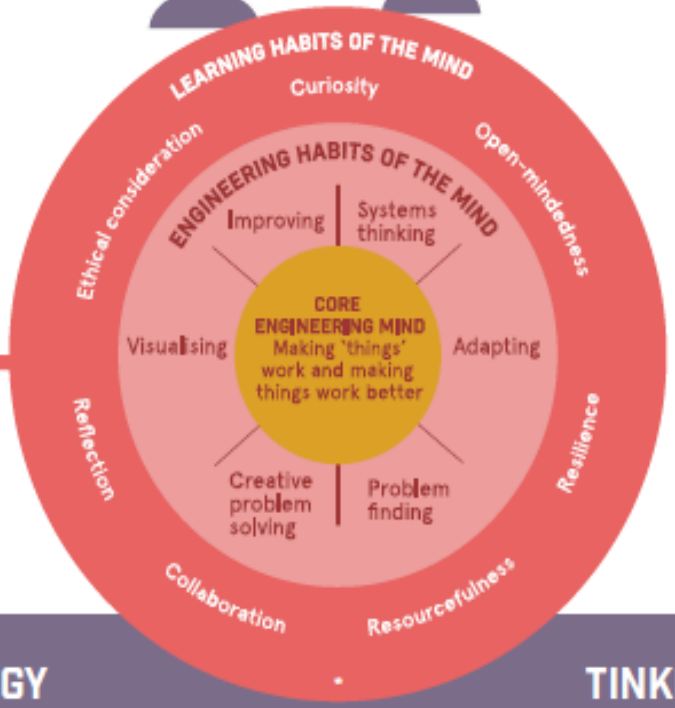
PROCESS with PURPOSE

making things and making things better





TINKER
T DO
REVIEW



[SCAFFOLD MODEL]

STAND BACK
LISTEN
WATCH
SUPPORT

TINKER T TINKOLOGY TINKENEERING

*Extract from 'Thinking like an Engineer' Royal Academy of Engineering 2014