

CREATING THE CONDITIONS FOR EFFECTIVE MODELLING

MIKE CUJES

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Where are we headed?

- What sort of conditions?
- Universal enablers
- Physical environment
- Task design considerations
- Teacher behaviours
- Dennis Denuto - the vibe



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Some outcomes of an effective modelling task/lesson?

Students increase their knowledge of and experience with the mathematical modelling process.

Students develop confidence as a modeller.

Students gain some insight into the nature of work many mathematicians do on a daily basis.

Students ENJOY engaging with an interesting problem or task.

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Task options

- Whole class exploration – teacher-led activity
- Group task – teacher allocated groups; student selected groups; randomly assigned groups
- Individual task

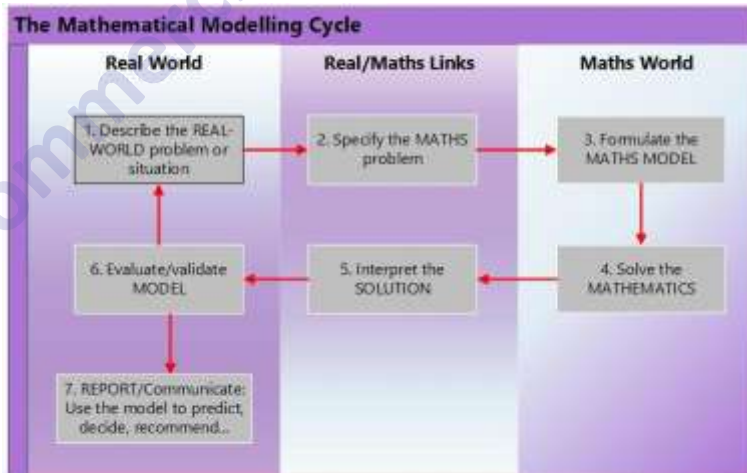
All of these options have their place – for the main part, I will be looking at group tasks.

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Universal enablers – increasing the success of a modelling lesson

Students should have prior exposure to and an understanding of the modelling cycle.

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Students should have prior exposure to and
an understanding of the modelling cycle.

5 Ps for teachers:

Prior planning prevents poor performance –
work the problem yourself!

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Are the 5 Ps really that important?

Yes – you want to ensure the task is accessible for students.

- Are there multiple pathways for students to explore?
- Is there a need to scaffold some components of the task for students?
- Are students equipped with the tools to come up with a solution?
- Would prior experience with a particular program or tool be useful for students?
(e.g. Excel/Desmos/Geogebra/Loggerpro/Google docs etc)?

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Universal enablers – increasing the success of a modelling lesson

Students should have prior exposure to and an understanding of the modelling cycle.

5 Ps for teachers:
Prior planning prevents poor performance – work the problem yourself!

Check-in with all groups after an initial reading and planning period.

What is the check-in period for?

Avoiding misunderstandings leading to a wasted lesson!



Gab Pili <https://unsplash.com/photos/zxkVDCyW8A>

VS



Annie Spratt <https://unsplash.com/photos/y8eP4K9Vzs>

Physical environment – low tech.

- Limited/no furniture flexibility
- Limited access to technology
- Largely pen and paper solutions



Hiruyoshi Urushima https://unsplash.com/photos/vfRKE_9wuPo

Physical environment – low tech.

Challenges:

- Splitting
- Lone Rangers
- Answer/solution focus
- Rabbit holes



Hiruyoshi Urushima https://unsplash.com/photos/vfRKE_9wuPo

Physical environment – low tech.

Enablers:

- Provide a large copy of the cycle
- Clarification of roles
- Large sheets of paper + markers
- Answer questions with questions (about the process/cycle)



Hirayoshi Urushima https://unsplash.com/photos/vRKE_9wuPo

What am I looking for in a successful group modelling lesson?

Group members have a shared understanding of the decisions made and the final model.

Students all feel some ownership of the model they developed.

Students ENJOYED engaging with an interesting problem or task

Hopefully students were able to come up with a reasonable model or solution within the time available too!

Physical environment – technology enhanced

Enablers and benefits:

- Shared documents
- Graphing tools
- Better shared understanding of the model and its development
- Increased checking in and communication

Challenges:

- Forgetting the modelling cycle!
- Technology barriers
- Often skip forming an initial model – boundary values



Marvin Meyer <https://unsplash.com/photos/SYT03xs06IU>

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Teacher specific enablers for technology enhanced classes

- Teach the technology that will be useful prior to the lesson.
- Answer questions with questions that refocus students on the modelling cycle:
 - “Where are you working in the cycle at the moment?”
 - “Why did you approach the problem this way – what assumptions did you make?”
- All other teacher factors mentioned before... exposure to the modelling cycle; 5Ps – work the problem; 5-minute check-in

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Physical environment – flexible learning spaces

A very positive effect on “success”:

- Immediate shared understanding
- More convenient and natural than shared documents
- Teacher can see which groups may need help more easily
- Less likely to abandon modelling cycle



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Physical environment – flexible learning spaces

Potential hindrances:

- Students should have prior exposure to using the spaces
- Lacking familiarity with collaborative work in maths
- Doodling!



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Dennis Denuto and the vibe!

- Small and frequent steps towards a supportive classroom culture
- Encourage inquisitiveness
- Support collaborative learning on a daily basis
- Get comfortable being uncomfortable
- Keep it in perspective



For further information and great classroom resources...

Please visit us at:
www.mathsmodellingenablers.com

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