# Real engagement in active problem solving

Real engagement in active problem solving (Maker & Pease, 2018)

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| **Steps** | **Your planning** |
| 1. Choose, or help students choose, a problem that is real to them.
* Focus on big, interdisciplinary ideas, principles and discipline based content you want students to know at the end of the learning
* Make sure the problem is developmentally appropriate for students
* Make sure the problem is relevant to students lives
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| 1. Decide on stakeholder groups or perspectives that are important for solving the problems.
* Students should have the opportunity to consider and integrate both multiple perspectives of the problem itself and multiple perspectives of the possible solutions to the problem
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| 1. Use prompts that enable students to follow a problem solving process to come up with creative and effective solutions.
* What do I know about this? (Gather/organise)
* What is the task? (Identify)
* How many ideas can I think of? (Generate)
* Which is the best idea? (Decide)
* Let’s do it (Implement)
* How well did I do? (Evaluate)
* Let’s tell someone! (Communicate)
* What have I learned? (Reflect)
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| 1. Use the following principles at appropriate steps in the problem solving cycle:
* Use hands on activities wherever possible
* Integrate cultures and languages of the student cohort
* Incorporate group activities and choice
* Encourage self-selected formats for products
* Flexible pacing
* Focus on inter-disciplinary themes
* Integrate visual and performing arts
* Encourage development of the ‘self’
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| 1. Use a continuum of closed, semi-open, and open-ended problem situation to structure problem solving experiences of different types.

Closed problems (single solution through a single pathway)Semi-open (a single solution, but more than one pathway to that solution)Open ended (Multiple pathways to multiple solutions)* Use the problem type appropriate to the learning situation
* Scaffold students from closed through to open problem solving
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Exemplar

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| **Steps** | **Exemplar** |
| 1. Choose, or help students choose, a problem that is real to them.
* Focus on big, interdisciplinary ideas, principles and discipline based content you want students to know at the end of the learning
* Make sure the problem is developmentally appropriate for students
* Make sure the problem is relevant to students lives
 | Students design a water park where water is conserved.Curriculum linkScientific understandings, discoveries and inventions are used to inform personal and community decisions and to solve problems that directly affect people’s lives [(VCSSU073)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU073) |
| 1. Decide on stakeholder groups or perspectives that are important for solving the problems.
* Students should have the opportunity to consider and integrate both multiple perspectives of the problem itself and multiple perspectives of the possible solutions to the problem
 | The following stakeholder perspectives need to be considered:* Community members
* Council
* Local environmental groups
* Local Aboriginal groups who may have different views on water and water usage

(Students engage with these perspectives in an activity where they have to role play a stakeholder)When solutions are proposed, stakeholder views are again considered. |
| 1. Use prompts that enable students to follow a problem solving process to come up with creative and effective solutions.
* What do I know about this? (Gather/organise)
* What is the task? (Identify)
* How many ideas can I think of? (Generate)
* Which is the best idea? (Decide)
* Let’s do it (Implement)
* How well did I do? (Evaluate)
* Let’s tell someone! (Communicate)
* What have I learnt? (Reflect)
 | **What do I/We know about this?** Students gather and organise their prior knowledge (for example)* Australian east coast has experienced a lasting drought
* For water parks to continue through times of water scarcity, they must be able to conserve water.
* There are ways that water can be recycled
* Water saving devices

**What is the task?**To design a water park for the local community that can conserve water **How many ideas can I/We think of?*** Recycling the water used in the park
* Using water recycled from elsewhere
* Using equipment designed to reduce the amount of water used in water activities (like water saving shower heads but for fun water games)

Students research and investigate what is possible.**What is the best idea?**A combination of recycling the water used in the park and using water saving devices.**Let’s do it?**Students create a design for the water park and provide a model for their proposal in a form of their own choice.**Let’s tell someone**Students share their proposals with their school community by displaying them in the school library.**What have I learnt?**Students reflect on the way Science has contributed to their solutions (most notably through the development of water saving devices) |
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 | Where possible, students are able to build their designs using construction materials, but they may also choose to create a 3D model using computer software. Students work in small groups. Bring in Aboriginal stakeholder views for students to consider.  |
| 1. Use a continuum of closed, semi-open, and open-ended problem situation to structure problem solving experiences of different types.

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 | **Some of the questions used to guide this inquiry:*** Who will benefit from the creation of a water park that conserves water?
* Is there anyone who may be disadvantaged by the creation of a water park that conserves water? How might this be managed?
* How can we create a water park that conserves water?
* What water saving devices are available that we can use in our water park to conserve water?
* How is water recycled? Can we use these techniques in our waterpark to conserve water?
* Are there ways that the activities in the park can be designed so they use less water?
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 **Adapted from:**

Maker, C. J., & Pease, R. (2018). Real Engagement in Active Problem Solving: An International Collaboration. *The SAGE Handbook of Gifted and Talented Education*, 262.

**This model uses features of the TASC wheel and the DISCOVER curriculum:**

Wallace, B., & Adams, H. B. (2018). TASC: Thinking actively in a social context: A universal framework for developing thinking skills and problem-solving across the curriculum. *The Sage handbook of gifted and talented education*, 246-253.

Maker, C. J., Jo, S., & Muammar, O. M. (2008). Development of creativity: The influence of varying levels of implementation of the DISCOVER curriculum model, a non-traditional pedagogical approach. *Learning and Individual Differences*, *18*(4), 402-417**.**