# 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 |  |
| 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 |  |
| 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) |  |
| 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’ |  |
| 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 |  |

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 link  Scientific 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) |
| 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’ | 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.   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 | **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? |

**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**.**