

Teacher instructions



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Throughout their schooling, students pick up a range of strategies for tackling different tasks. Some become great at adapting and applying these strategies across subjects and new challenges, while others tend to stick with what worked once, even when it doesn't quite fit (Dinsmore, 2018).

When it comes to problem-solving, even our most capable learners can struggle to manage the many moving parts of a real-world challenge (Greiff et al., 2014). That's why we focus on building flexible problem-solving competencies—so students can identify their particular skills and preferred roles in problem solving which they can mix and match to find the best solutions. Additionally, this process provides them with areas to focus on for improvement and ways of working that may drive future career choices.

References:

- Dinsmore, D. L. (2018). *Strategic Processing in Education* (1st ed.). Taylor and Francis. <https://doi.org/10.4324/9781315505732>
- Greiff, S., Wüstenberg, S., Csapó, B., Demetriou, A., Hautamäki, J., Graesser, A. C., & Martin, R. (2014). Domain-general problem solving skills and education in the 21st century. *Educational Research Review*, 13, 74-83. <https://doi.org/10.1016/j.edurev.2014.10.002>
- Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional Science*, 26(1/2), 113-125. <https://doi.org/10.1023/a:1003044231033>

But we can't just hope they make these connections on their own. We need to guide them through the process, helping them reflect on what worked, what didn't, how they can adjust their approach, and what they'll try next time (Schraw, 1998). These reflections also help students recognise their own strengths—sometimes ones they haven't noticed before—and see the power of working with others who bring different skills to the table. By making reflection a regular part of learning, we give students the tools to become more thoughtful, adaptable problem solvers.

The 'Student Competency Reflection' questions can be used as a guide for a class discussion or a reflective piece of writing.

This type of reflective work is crucial to developing **personal and social capability**.

Self awareness

Personal Awareness

- Level 4 (Years 5-6)
 - Analyse the influence that choices have on developing personal qualities and identify areas for growth

Reflective practice

- Level 4 (Years 5-6)
 - Analyse personal abilities and achievements by seeking feedback

Self-management

Goal setting

- Level 4 (Years 5-6)
 - Select and use strategies to monitor own learning and refine goals to plan for further improvement

Student competency reflection

A **competency** is a mix of skills, knowledge, and abilities that help you do something well. It's like having the tools and know-how to complete a task or solve a problem. Often we need teams of people who each bring important competencies to solving a problem.

Before the task

In the task, which competencies would be the most useful to solve the problem? Why?

After the task

Which problem solving competency did you use the most? Why?

Which did you think you were best at using? Why do you think that?

What did your team mates bring to task? What can you learn from them?

What problem solving competencies were missing? Why?

What problem solving competency do you plan to improve on in the future? Why?

Reflective activities for Science Students

Nature and development of science

AC9S6H01

Examine why advances in science are often the result of collaboration or build on the work of others

Use and influence of science

AC9S6H02

Investigate how scientific knowledge is used by individuals and communities to identify problems, consider responses and make decisions

Example activity 1

Electronic quiz: Students work in teams to design and build a circuit-based machine that tests others' knowledge on a chosen topic. They must develop an effective format, ensure clear feedback for participants, and identify key problem-solving competencies needed for the task. Afterward, they reflect on what types of competencies are best for the task, what was missing from the task, and the competencies they developed through the process.

Reason for the design

Highlight the importance of planning: Groups that think more carefully about this task before undertaking it are likely to have better results. It is important to highlight this in later reflective discussions.

Content: This task requires students to think about the theory of electronics AND practicalities of circuit design ([AC9S6U03](#))

Timeframe: Sometimes, a simple activity is enough to encourage meaningful reflection. By providing the essentials for this task and integrating it at the end of a unit on circuits, you can keep it time-efficient while emphasising the thinking skills students apply throughout the process.

Reason for the design

Promote empathy for audience needs:

Empathy is required for good communication. This task allows students to reflect on what they view as good communication and understand what influences an audience.

Enable discussion on project management:

Students often lack agency in the way they attempt group tasks. This task is specifically flexible and will bring up a number of common obstacles (e.g. lack of resources, time management) which can be explored more explicitly after the experience. The aim is not the best output but a consideration of the processes leading to the output which can assist in future tasks.

Example activity 2

Socio-scientific issues: Students collaborate in teams to create a communication piece (e.g. print, video, art) presenting both sides of a significant scientific debate. They must consider the competencies required to create the piece, their target audience, and how to coordinate the tasks effectively. Their reflection will examine the production process and reasons why they made their choices, and include peer assessment of the final communication.

Example debate topics: AI in education, helmet laws, the environmental impact of 3D printing.

Example activity 1

Playground Renewal: Students assess a local playground or public space and develop a redesign plan to enhance inclusivity, safety, and engagement. They must consider accessibility, material durability, and budget constraints, working within a set budget and material costs. Their final design is presented through a scaled model and a persuasive virtual advertising campaign aimed at the local community.

Each task requires distinct competencies, so teams must strategically assign roles based on

their strengths, using character avatars to guide decision-making. If gaps in expertise arise, teams can subcontract tasks to others, using their budget to "pay" for external skills and resources. Keeping teams small fosters collaboration and encourages seeking outside support.

Collaborating and managing **AC9TDE6P05**

Develop project plans that include consideration of resources to individually and collaboratively make designed solutions

AC9TDI6P08

Select and use appropriate digital tools effectively to share content online, plan tasks and collaborate on projects, demonstrating agreed behaviours

Reason for the design

Budgeting: A key aspect of this task is using money as a constraint. This encourages students to prioritise essential design elements rather than including every idea that comes to mind. It also highlights the importance of having a team member who is budget-conscious, a point that should be explored in the reflective discussion.

Subcontracting: Subcontracting aligns with budgeting and mirrors real-world collaborative work. Effective teams assess individual strengths and weaknesses, strategically planning to achieve the best outcome.

Before beginning, discuss key skills relevant to the task, helping students recognise their own competencies. Subcontracting carries a cost—whether financial (hiring external help) or time-based (redistributing tasks within the team)—but every member plays a crucial role. Highlight skills often overlooked in traditional schoolwork, such as computer skills, technical drawing, advertising, jingle creation, or videography.

Reason for the design

Lowering cognitive load to permit

reflection: Building on an existing design reduces cognitive load when developing and promoting a new task while still engaging various problem-solving competencies. The goal of this task is to collaboratively create designed solutions, providing a framework for students to identify the competencies they have used and those they still need to develop.

Example activity 2

Innovation pitch: Students work in teams to improve a product from the Shonky Awards, ensuring it appeals to the original target audience. Before they start the design process they consider the problem solving competencies that would be particularly relevant to the task and identify who will take on this role. During the reflective phase, students evaluate both the final product design and the problem-solving strategies they employed. They also reflect on how their own competencies have evolved, and what they need to develop for future projects.

Person and Social Capability

Self awareness

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Health

AC9HP6P01

Explain how identities can be influenced by people and places, and how we can create positive self-identities

Example activity 2

Problem solving competencies auction: In teams of three, students receive 100 points to bid on 21 problem-solving competencies based on a given scenario (examples below). They must prioritise the most essential skills for the task. After bidding, students reflect on their choices and justify their selections. A class discussion will explore why some competencies were valued more than others for the given scenario.

Example scenarios:

- I am planning an end of year party for the class, but nobody can agree on the theme or the music.
- Something is wrong with my backyard and the plants are dying. I need to find a solution.
- My council plans to build soccer pitches on a former golf course in a national park. I love the sport but worry about wildlife, so I'm mobilising the community to stop it happening.

Example activity 1

Character development: Students design a character avatar that represents their unique blend of problem-solving competencies. To help them recognise their strengths, consider starting with a gallery walk where peers anonymously write positive traits about each student.

Each student will then create a backstory—either realistic or imaginative—to illustrate how their character developed these competencies over time. They will also set future goals, identifying the problem-solving skills they believe will be most important for their success in high school.

Present the information on a card, showcasing their character's strengths, growth, and aspirations.

Reason for the design

Reflective goal setting: This task allows students to reflect on their academic self-concept, recognising problem-solving skills as evolving rather than fixed. They identify future challenges and strategies for success based on their own goals. Given the depth of this task, class discussions will play a vital role in guiding students through the process. It is best introduced after students have had the opportunity to assess their competencies in other activities.

Reason for the design

Recognising that different aims require different competencies: Exploring why certain skills are valued in different contexts helps students recognise how their own problem-solving strengths can contribute to any task. This also links to future career choices, guiding them toward roles that align with their preferred competencies. Pairing this with the 'Character Development' activity can support goal setting.