TEACHING TECHNOLOGIES
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Explicit Instruction, Problem Solving, The Middle Way and other 21st Century Skills

Rationale

Why Explicit Instruction?
Explicit Instruction is our Pedagogical Framework and common language of instruction. It is important that we maintain this learning culture and support our colleagues by being consistent in our practices.

Hattie’s Effect Size 2016 Update reiterates the significant effect of Direct Instruction and adds collective teacher efficacy as making a big difference.

Why Problem Solving?
Teaching problem solving has a higher effect size than Direct Instruction

In the Technologies learning area, we use the Problem-based learning framework
[Digital Solutions 2019 v1.0 General Senior Syllabus – QCAA]

Why 21st Century Skills
This should be a known factor by now, but some recent articles are:
The New Basics - Foundation for Young Australians
The Commonwealth Bank jobs and skills of the future report.
Australian Curriculum General Capabilities
Read also: Digital Solutions 2019 v1.0 General Senior Syllabus – QCAA

What is the Middle Way
A balance needs to be struck between:
1. Explicit Instruction and learning by Inquiry
2. Teacher directed and Student directed
3. Projects and Project-Based Learning (PBL)

The balance between Explicit Instruction and learning by Inquiry
The majority of research backs the effectiveness of Explicit Instruction; particularly for A-E data. Inquiry-based teaching has an effect size of 0.35 (below 0.4 significance), compared with 0.6 for Direct Instruction.

However, being able to inquire is an important 21st century skill. As part of their place in our contemporary world, students need to be able to define what they need to know and plan a search to find the answer; locate data and information; and select and evaluate the answer.
Another important 21st Century behaviour or quality is for students to be self-managing and self-directed.

The Middle Way strikes a balance between the two by modelling and guiding students through the inquiry process. With the gradual release of responsibility, the goal is always to impart these skills so that students can apply them independently.

Implicit instructional strategies, based on constructivism and active learning allow for personalised and student-directed inquiry. While students can learn Higher Order Thinking skills in a guided way with explicit instruction, implicit instruction focuses more on applying these skills to solve problems and challenges. With this approach, also, students need to identify the ‘just in time’ knowledge and skills that they need and use a discovery approach to learning. In an emerging world where students need to be able to communicate, collaborate, think critically and create, these strategies need to be regularly employed. When combined, these strategies are enabling and transformational and increase the depth of learning.

Perhaps the best way to demonstrate the relationship between explicit and implicit instruction is by looking at the taxonomy or continua within the implicit instruction of inquiry and Project-Based Learning.

So, there needs to be a balance between both approaches. Move between “Sage on the Stage” and “Guide on the Side.” With the speed of technology changes, don’t be afraid to be a co-learner as well.

**The balance between Teacher directed and Student directed**

It is clear that Teacher led instruction is more effective than purely Student led learning. However, in the Technologies learning area, the problems that we want students to tackle are often complex and don’t benefit from teacher imposed constraints. To account for this, we will head the advice in [Digital Solutions 2019 v1.0 General Senior Syllabus – QCAA](#):
In technologies:

- problem-based learning is an active process of knowledge construction that uses open-ended problems as a stimulus for student learning
- problems that support problem-based learning should challenge and motivate students to engage their interest
- provide opportunities for students to examine the problem from multiple perspectives or disciplines
- provide multiple possible solutions and solution paths
- require students to comprehend and use a breadth and depth of knowledge during problem-solving
- recognise students' prior knowledge
- recognise students' stage of cognitive development
- provide opportunities to allow all students to explore innovative open-ended solutions
- relate to the real world
- the learning environment is organised to represent the complex nature of the problems students are required to solve, e.g. the learning area values collaboration using teamwork and brainstorming, as these are strategies used during real-world problem-solving
- the teacher is responsible for scaffolding student learning and cognition during problem-solving as a coach, guide or facilitator to maintain the independence and self-directedness of student learning
- self-directed learning does not mean students are self-taught; instead, teachers balance their participation so that students maintain responsibility for learning, e.g. students make decisions about the knowledge and skills they require to effectively solve a problem, supported by the teacher’s questioning and cueing strategies
- the perception of student self-direction in the learning process is fundamental to problem-based learning.

Problems
Central to problem-based learning is the provision or identification of suitably challenging, subject-specific, context-relevant, real-world problems. Student engagement with these problems
facilitates student learning of Digital Solutions subject matter. Problems suitable for Digital Solutions:

- are identified as any human need, want or opportunity that requires a new or re-imagined digital solution
- are identified by teachers, clients and/or students in situations related to unit-specific and subject-relevant technologies elements, components, principles and processes
- promote purposeful analytical activities undertaken in response to an identified real-world related problem that requires a digital solution
- are resolved using the problem-solving process.
The balance between Projects and Project-Based Learning (PBL)
The big difference between “Doing Projects” and PBL is the process. Amy Mayer has compared the two:

<table>
<thead>
<tr>
<th>Projects . . .</th>
<th>Project Based Learning . . .</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can be done at home without teacher</td>
<td>Requires teacher guidance and team collaboration.</td>
</tr>
<tr>
<td>guidance or team collaboration.</td>
<td></td>
</tr>
<tr>
<td>Can be outlined in detail on one piece</td>
<td>Includes many “Need to Knows” on the part of the students and teachers.</td>
</tr>
<tr>
<td>of paper by the teacher.</td>
<td></td>
</tr>
<tr>
<td>Are used year after year and usually</td>
<td>Is timely, complex, covers many TEKS, and takes a team of highly trained professionals</td>
</tr>
<tr>
<td>focus on product (make a mobile, a</td>
<td>significant time to plan and implement.</td>
</tr>
<tr>
<td>poster, a diorama, etc.)</td>
<td></td>
</tr>
<tr>
<td>The teacher work occurs mainly after</td>
<td>The teacher work occurs mainly before the project starts.</td>
</tr>
<tr>
<td>the project is complete.</td>
<td></td>
</tr>
<tr>
<td>The students do not have many</td>
<td>The students make most of the choices during the project within the pre-approved guidelines.</td>
</tr>
<tr>
<td>opportunities to make choices at any</td>
<td>The teacher is often surprised and even delighted with the students’ choices.</td>
</tr>
<tr>
<td>point in the project.</td>
<td></td>
</tr>
<tr>
<td>Are based upon directions and are</td>
<td>Is based upon Driving Questions that encompass every aspect of the learning that will occur and</td>
</tr>
<tr>
<td>done “like last year.”</td>
<td>establishes the need to know.</td>
</tr>
<tr>
<td>Are often graded based on teacher</td>
<td>Is graded based on a clearly defined rubric made or modified specifically for the project.</td>
</tr>
<tr>
<td>perceptions that may or may not be</td>
<td></td>
</tr>
<tr>
<td>explicitly shared with students, like</td>
<td></td>
</tr>
<tr>
<td>neatness.</td>
<td></td>
</tr>
<tr>
<td>Are closed: every project has the</td>
<td>Is open: students make choices that determine the outcome and path of the research.</td>
</tr>
<tr>
<td>same goal. (As in the example below,</td>
<td></td>
</tr>
<tr>
<td>the end result is always The Alamo.)</td>
<td></td>
</tr>
<tr>
<td>Cannot be used in the real world to</td>
<td>Could provide solutions in the real world to real problems even though they may not be</td>
</tr>
<tr>
<td>solve real problems.</td>
<td>implemented.</td>
</tr>
<tr>
<td>Are not particularly relevant to</td>
<td>Is relevant to students’ lives or future lives.</td>
</tr>
<tr>
<td>students’ lives.</td>
<td></td>
</tr>
<tr>
<td>Do not resemble work done in the real</td>
<td>Is just like or closely resembles work done in the real world.</td>
</tr>
<tr>
<td>world.</td>
<td></td>
</tr>
<tr>
<td>Do not include scenarios and</td>
<td>The scenario or simulation is real or if it is fictitious, is realistic, entertaining, and</td>
</tr>
<tr>
<td>background information or are based on</td>
<td>timely.</td>
</tr>
<tr>
<td>events that have already resolved.</td>
<td></td>
</tr>
<tr>
<td>Are sometimes based around a tool for</td>
<td>Use technology, tools, and practices of the real world work environment purposefully. Students</td>
</tr>
<tr>
<td>the sake of the tool rather than of an</td>
<td>choose tools according to purposes.</td>
</tr>
<tr>
<td>authentic question. (Make a Prezi.)</td>
<td></td>
</tr>
<tr>
<td>Are turned in.</td>
<td>Is presented to a public audience encompassing people from outside the classroom.</td>
</tr>
<tr>
<td>Are all the same.</td>
<td>Is different.</td>
</tr>
<tr>
<td>Make a model (or diorama or mobile . .</td>
<td>Design a fortification that would take your community through a bio (or other non-traditional</td>
</tr>
<tr>
<td>of the Alamo.</td>
<td>and make a recommendation to the city council for future planning.</td>
</tr>
</tbody>
</table>
documents. Every year at ABW everyone agrees that they see anecdotal (students are actively engaged in activity) evidence of good learning outcomes; and these are mainly “soft skills”. But when you drill down, the learning is not linked or assessed against any curriculum standards.

The main pillar of PBL is student led inquiry and this has been shown to have a low effect size. In my own attempts at PBL, I ended up scaffolding the process for rigorous assessment so much that it became much closer to Teacher led Explicit Instruction. PBL may be very effective if it is overlayed on a learning culture with a growth mindset, student agency and self-management and students have well developed social and emotional skills.

The middle way strikes a balance between the two and marshals explicit teacher guidance throughout the problem solving cycle, with constant formative assessment, coupled with the gradual release of responsibility for summative assessment. 21st Century and future skills and behaviours are still embedded throughout but they are explicitly modelled and taught. Students need spaced practice and the gradual release of responsibility to formatively master these skills before being released on their own and summatively assessed. Likewise, with the problem solving cycle. Students will need to go through several iterations before they can work independently.

The balance between Explicit Instruction and Blended learning

Blended learning works well when there is a high level of students agency and self-management, coupled with a Growth Mindset. However, if you are not quite there yet, try Not Quite Blended learning.

In the technologies area, there are many online self-paced courses; that even have learning management built in. There are others that have a series of video tutorials to follow and you can easily create a schedule for students to follow. To increase the effectiveness of student learning with these, it is a good idea to leverage both Pair Programming and the Gradual Release of Responsibility within Explicit Instruction. To do this, start off modelling (I do) the process of watching an instructional video or interactive presentation, pausing and reproducing the instructions within the application or development environment. In pair programming, this would be one screen for the instructions and one for the development environment. Then students can follow (We Do) until you are confident that they can keep going independently (You Do). You may need to keep going with this process from lesson to lesson with the below proficiency students, while the above proficiency students may go off ahead; effectively differentiating and personalising learning.

Assessment Types

Examination

Combination response

This assessment will include a combination of one extended response, a number of short response and/or multiple-choice questions.

Extended response

• is constructed using one item; the item is a response to an unseen problem based on stimulus material
• requires sustained analysis, synthesis and evaluation to fully solve a problem.
Short response

• consists of a number of items that ask students to respond to the following activities:
  - sketching, labelling or interpreting tables or diagrams
  - multiple-choice, sentence or short-paragraph responses
  - writing and calculating using algorithms
  - responding to unseen stimulus materials.

• where applicable, students are required to write in full sentences, constructing a response so that ideas are maintained, developed and justified.

Investigation — technical proposal

This assessment requires students to research a specific problem through collection, analysis and synthesis of information. A technical proposal uses research or investigative practices to assess a range of cognitions in a particular context. Research or investigative practices include locating and using information beyond students’ own knowledge and the data they have been given.

They iteratively explore, develop, generate and evaluate low-fidelity prototypes of user interfaces, algorithms and data in response to the identified problem. Students identify a single low-fidelity prototype digital solution and communicate the technical feasibility of the solution through a multimodal presentation.

The presentation of this investigation is multimodal. A multimodal presentation is the dynamic convergence of two or more communication modes within the same response and where all modes are attended to as part of meaning-making. Multimodal presentations can be delivered via different media or technologies. A variety of technologies are used to create or present the response. Replication of a written document into an electronic or digital format does not constitute a multimodal presentation.

There is no requirement for this presentation to be performed or conducted in front of the class or the teacher. For example, a multimodal presentation might be pre-recorded and presented to the teacher electronically. Each student may choose the mode/s and method of their presentation.

These may need to be negotiated with the teacher. Examples of a multimodal presentation include:

• a web page, in which elements such as visual effects, oral language, written language and still or moving images are combined
• a slideshow or animation documenting the application of the problem-solving process
• multimedia movies that may combine photographs, video, sound, text and a narrative voice
• a webinar, vodcast or podcast.

Project — digital solution

The response is a coherent work that documents the iterative process undertaken to develop a solution to a technical proposal supplied by the teacher.
The project is multimodal, using two or more communication modes within the same response, where all modes are used to provide evidence of the assessable objectives. Other examples of a multimodal presentation for this instrument include:

- a document containing written text, annotations, algorithms, code, screenshots, pictures and/or sketches
- a digital video that may combine images, video, sound, text and a narrative voice.

Project — folio

In the Project — folio, students document the application of the problem-solving process in response to an identified real-world digital problem. Where this differs, from Project — digital solution, is that it provides more flexibility in using parts of the problem solving process or using the whole cycle on parts of the problem. With this, you can explore and evaluate one aspect of a topic and then develop and generate for a different aspect. For example, students could research data exchange, generally; then create a data exchange simulation; then look at the data security and privacy risks associated with transferring data between two digital systems. This is similar to an Extended Written task but engaging the Problem Solving Process.

Summative versus Formative Assessment

Ideally, you should front-load your assessment and create the summative assessment item before you start the unit. You then provide opportunities for students to acquire the critical content needed and practice with formative assessment tasks that are similar; with feedback.

In the case of exams, this is easy because you can give students short answer extended response tasks as they move through critical content topics.

In the case of investigations and projects, this is not so straightforward. Initially, you can introduce or review (if they have done this in previous years) the problem solving process and have students formatively practice each step. This is why an investigation is a good assessment task to start with, rather than a project. Then, when you start a project (maybe in the second unit), students have already had a formative practice. Even then, students don’t need to complete the summative project task completely independently. The best approach is to give feedback (and peer feedback), against the assessment criteria, at every step of the project problem solving process. This way, their first attempt is formative and they are given formative feedback; ready for them to revise their product for summative assessment.

If the investigation or project requires students to demonstrate a technical skill (as well as problem solving), such as coding or building a database, then this too can be assessed formatively; while they are learning the critical content. This could be part of a lead-in to the project and an extension to what they already know. I.e. They have already completed a coding unit and now they are doing a project involving Arduino library functions or they have completed a unit in designing databases and using SQL and now they have a project to create an information system. If, however, students have none or little foundation knowledge, I recommend starting with a unit where they form these foundations and assess them with an exam.
Explicit Instruction

LESSON STRUCTURE

WARM UP
ENGAGE ✤ REVISIT ✤ REVISE
SPACED PRACTICE

OPENING
WALT – We are learning to...
WILF – What I am looking for...

BODY
I DO – Teacher models
WE DO – Guided practice
YOU DO – Partner practice
YOU DO – Independent practice

CLOSING
REVIEW ✤ REFLECT ✤ RESPOND
WHERE TO NEXT?
# Lesson Structure

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>TEACHER</th>
<th>STUDENT</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARM UP</strong></td>
<td>• Revise key concept/skill (spaced practice)</td>
<td>• Arrives on time and is prepared</td>
<td>What concept or fact do I want students to consolidate?</td>
</tr>
<tr>
<td></td>
<td>• Aim to build automaticity and speed in student recall</td>
<td>• Draws on prior knowledge and makes connections</td>
<td>Is there opportunity for all students to experience success?</td>
</tr>
<tr>
<td></td>
<td>• Brisk pace is key to engagement</td>
<td>• Responds every time, every question</td>
<td>Is there opportunity for all students to experience success?</td>
</tr>
<tr>
<td></td>
<td>• Build success with corrective feedback</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WALT/WILF</strong></td>
<td>• State explicit learning intention</td>
<td>• Can state what they are learning</td>
<td>Are the questions effective?</td>
</tr>
<tr>
<td></td>
<td>• State and explain success criteria</td>
<td>• Can state what they will be able to do if they are learners</td>
<td></td>
</tr>
<tr>
<td><strong>I DO</strong></td>
<td>• Explain, model using clear concise language</td>
<td>• Takes responsibility for learning</td>
<td>Can students state the outcome of the lesson?</td>
</tr>
<tr>
<td></td>
<td>• Explain, model to demonstrate the concept</td>
<td>• Actively listens</td>
<td>How will I elicit student responses?</td>
</tr>
<tr>
<td></td>
<td>• Learning is sequenced into small steps</td>
<td>• Asks for clarification</td>
<td>How will they know if they achieve success?</td>
</tr>
<tr>
<td></td>
<td>• Think-aloud strategy is used</td>
<td>• Responds to questions</td>
<td>What instructional strategies are appropriate?</td>
</tr>
<tr>
<td></td>
<td>• Examples and non-examples are modelled</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can occur in one lesson or a series of lessons</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WE DO</strong></td>
<td>• Guided practice in differentiated groups or whole class, build profiency and confidence</td>
<td>• Takes on more responsibility as the phase progresses</td>
<td>Is the language clear and concise?</td>
</tr>
<tr>
<td></td>
<td>• Fade out support to You Do partner / independent</td>
<td>• Ask questions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Observation, frequent questioning and corrective feedback are used to ensure understanding</td>
<td>• Provides and explains responses</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can occur in one lesson or a series of lessons</td>
<td>• Prepared to work with others</td>
<td></td>
</tr>
<tr>
<td><strong>YOU DO PARTNER INDEPENDENT</strong></td>
<td>• Partner, individual or group work aligns to I Do, We Do concept</td>
<td>• Takes responsibility for learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Differentiate tasks</td>
<td>• Completes task relying on environmental print, notes, peers and classroom learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Actively monitor students and provide feedback</td>
<td>• Prepared to work with a partner</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Can occur in one lesson or a series of lessons</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>REVIEW REFLECT RESPOND</strong></td>
<td>• Initiate reflection, Guide, question and prompt as required</td>
<td>• Articulates steps of lesson and their new learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Summarise learning</td>
<td>• Responds to learning using oral and written form</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Go over big idea</td>
<td>• Set future goals</td>
<td></td>
</tr>
</tbody>
</table>
WALT/WILF
Everything you need to know to generate these are in this guide:

LEARNING DESIGN AND MANAGEMENT PLANNING PROCESS FOR QUEENSLAND SCHOOLS

WARMUP
Providing a preview of a learning sequence has been found to be highly effective (Marzano). At the start of each learning sequence, we wish to hook the learners and pique their curiosity about the learning to come. This learning hook can come in many forms, it could be a short video, a question, an image, a puzzle or any other prompt that promotes thinking and curiosity.

Some examples are:
- Use ICT to preview new content
- Play a youtube video as students enter
- Pose a ‘Socratic’ question
- Give a short pre-test
- Have students play a game
- Project an image at the start of a lesson
- Demonstrate a physical behaviour such as a chemical reaction and ask ‘why is it so?’
- Read an interesting quote from a famous person.
- Analyse a tag cloud of the topic for high frequency words

I DO
Once learners understand what and why they are learning, there may be some learning input that will provide new knowledge. This could be a teacher modelling to the whole class how to perform a particular skill, using the Gradual Release of Responsibility strategy. It could equally be a video tutorial, peer learning or exploration. The core commonality is that the learners acquire new knowledge, which they will be able to use to construct deeper understanding.

Some examples using ICT:
- Watch a video and answer questions
- Conduct an inquiry
- Create a virtual classroom to curate ALL content
- Reduce cognitive load for students by sourcing multi-modal content
- Let the content do the “chalk and talk” for you. i.e; there is probably a youtube or teacher tube clip out there that will say it better and students can watch it several times until they get it.
- If you do “chalk and talk”, record it and upload it to provide a bank for review/revision. You can then build on this to ‘flip’ your classroom. i.e: have students review the material for homework and then go straight into the ‘we do’ step.
- There are a heap of online learning activities that you can access.
- Why not explain a concept with some else’s animation.
WE DO
- Learning input should always be paired with learning construction. This is time when learners are actively constructing their understanding by doing. This is an opportunity to play with new knowledge – to experiment, push boundaries, fail and retry – and is essential in creating connections between new knowledge, which is the foundation of genuine understanding.

- Don’t forget, you are in a blended classroom (face-to-face and online), so this is a good place to model the skill or thinking process you intend. There are many online graphic organisers that you can use to organise your thinking and you would model how to use them. Use your projector here and have students follow your lead. Ask questions about where students are before moving to the next step. If “chalk and talk” is a better approach, then consider recording it and adding it to your bank.

- Again, you are working in a blended environment, so you could use grouping strategies and have students work in small groups to refine the process from the above step. This could be done using butchers paper and then the product of learning photographed and uploaded for sharing. There are many collaborative strategies that will work.

- An alternative is to pair match students (pair programming) from the start (stronger with weaker) and then you always have groups and pair/reciprocal learning.

- Most graphic organisers can be set up online so that all students can contribute to them.

- Research online is actually a complex process. You would be advised to train your students well in this area.

YOU DO
- In order to make their learning explicit, we should provide all learners with the opportunity to participate in a learning demo where they demonstrate their understanding of the knowledge set we determined in the learning outcomes. This is important not only for the learner to have the
opportunity to share what they know, but also for you as a teacher to gather data on progress and make decisions about the next steps in learning: do you need to cover something again, are the learners ready to move on to the next stage?

- The easiest way to do this formative check is to set up a blog for students to post the artefacts of their learning.
- There are a heap of online student response systems that you can use for your formative check.
- The best way to personalise learning is to create a Learning Journal in your virtual classroom. Then in the down time towards the end of the lesson, students can be trained in the habit of journalising and reflecting on their learning by answering questions such as:
  1. What was the Learning Intention and Success Criteria for this lesson?
  2. Did you achieve it? Show the evidence for this.
  3. If this activity was part of your assessment, according to the Success Criteria, what would you achieve?
  4. What do you need to do to achieve more?
- This process can be strengthened by including it as part of your summative assessment. You can then tell students that they will need to submit these reflections as part of their communicating and collaborating online protocols. I build this into all my assessment tasks, even exams, where I expect them to have this in the dropbox as part of their assessment. I also include success criteria in every lesson.
- As part of the pair-matching, learning partners can then give each other guided feedback. Teachers can also monitor this when determining what differentiation strategies are needed. Again, this is part of the established communication and collaboration protocol and should be included in summative assessment. Use Peer Feedback at the end of a topic/theme.
- Any assignment assessment task can be integrated with ICT! Students can present the artefacts of their learning as a comic strip, web page, animation, audio, video, graphic and multi-modal combinations of these. If you want to step up to the next level, the try Project Based Learning or Problem Based Learning or contemplate a Webquest.
- If you have a virtual classroom or an edStudio space, then students can maintain a reflective ePortfolio as part of their learning.
- Digital Bloom’s
- Visible Thinking
- Product - How students demonstrate what they know
- Environment - How learning is structured
- What classroom routines will I establish when using ICT?
- How will I organises the layout of my online space to facilitate learning.
- How can I use ICT to organize students to interact with new knowledge?
- Organizing Students for Cognitively Complex Tasks, using ICT

REVIEW REFELCT RESPOND
The final element of learning design we will discuss is learning reflection. This is the opportunity for learners to reflect on themselves and their progress. The ability to meta-reflect on one’s own
development as a learner is an incredibly powerful capacity in a world where the cognitive demands upon us are such that we are constantly forced to reconceptualise and think elastically.

A good strategy is to use Proficiency Scales and have students reflect on their learning in a learning journal (in your virtual classroom) or Personalised ePortfolio. This is also a great opportunity for Feedback.

Some reflective questions:
1. Where were you going? What was your goal.
2. How are you doing? What is your current score on our Proficiency Scale? What evidence do you have?
3. What do you need to do next? How can you improve your score?

REMEMBER:

<table>
<thead>
<tr>
<th>If</th>
<th>Then</th>
</tr>
</thead>
<tbody>
<tr>
<td>•goals provide clear targets for learning</td>
<td>•feedback facilitates the process of reaching those targets.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Where am I going? (Goal setting)</td>
<td>Teacher gives encouragement &quot;Work Hard/ Try your best&quot;</td>
<td>Pupils know and understand what task needs to be completed.</td>
<td>Pupils know and understand the underlying processes involved in completing the task.</td>
<td>Pupils are able to set and/or reference their own learning goals (including success criteria).</td>
</tr>
<tr>
<td>FEEDUP</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How am I doing? (Feedback)</td>
<td>Teacher gives affirmation and praise.</td>
<td>Teacher informs pupils as to whether the task is correct or incorrect.</td>
<td>Teacher supports and confirms the pupils’ ability to sift and sort the underlying processes in the task.</td>
<td>Pupils fit the effective learner profile; They know how they are progressing, can assess and support themselves. They understand and exploit peer assessment and meta-cognition skills. Teacher affirms this.</td>
</tr>
<tr>
<td>FEEDBACK</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What do I do next?</td>
<td>Teacher gives further encouragement regarding future learning.</td>
<td>Teacher explains the next task.</td>
<td>Teacher explains the next steps in terms of processes and strategies.</td>
<td>Pupils are able to identify their own next steps. Teacher affirms this.</td>
</tr>
<tr>
<td>FEED FORWARD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Hattie)

Formative Assessment – WE DO vs YOU DO

Explore
The whole class and teams can collaboratively identify, decompose and analyse problems. For example, the whole class (we do) can brainstorm and contribute to a padlet to identify the
functional and non-functional constraints to a problem. Individual students (you do) can then form sentences to write the analysis or put the data in a tabula form. Later, students may repeat this process/skill on a summative assessment task and collaborate in teams on the analysis. Individual students would then perform the final construction of the analysis individually.

Develop
The whole class can be led through developing designs for a part of the solution (we do). For example, a single screen design or a function from a much larger coded solution. Then teams can work on another part (we do together). Finally, individuals can work on a part alone (you do). Later, as part of a summative assessment task, the process/skill can be repeated, with the design tasks being divided between team members. Another option (especially for ideation) is for team members to create individual designs and then evaluate to include the best in the team solution; or even combinations of the two designs, to create a third. This way, the individual designs can be submitted for assessment and the evaluation can be included.

Generate
Teams (we do) of students can divide (you do) tasks to construct solutions. Alpha testing can be conducted individually.

Evaluate and refine
The whole class (we do) can be led through skill of evaluating and produce a final (you do) evaluation.

Explicit Instruction and Computer Labs
Classroom Management Software can be effectively leveraged to manage the Explicit Instruction lesson structure. In particular, screens can be blanked or the teacher screen can be projected onto student monitors for the ‘I do’ segment. The teacher can also monitor understanding during the ‘we do’ and ‘you do’ segments, as all computer screens can be viewed and controlled. Likewise, individual computer screens can be projected onto all student screens in order to share exemplary work or even for students to peer-tutor the class.

Explicit Instruction and ‘Flipped’ Learning
The ‘I do’ segment of the lesson can be either pre-recorded (using screen capture software) or can be sourced from places like youtube. The class can then be instructed to review the video for homework; before launching into ‘we do’ during class.

A ‘backflip’ can be achieved by recording (using screen capture software) your ‘I do’ segment (as you do it in class) and making it available for review online. This is a good (blended) approach for spaced practice (going over the same or similar skills) or when students need self-directed guidance during class or at home. This is particularly good if you need to differentiate instruction in a proactive way because you have different identifiable groups in your class, operating at different levels (below proficiency, proficient and above proficiency).

Explicit Instruction and Virtual Classrooms

Lesson Structure
Incorporate the Elements directly into your content items and use these icons as a focus:
Critical Content, Collaboration and Communication

The advantage of having a virtual classroom is that your classroom can be paperless and available 24/7 for spaced practice, revision and review. It is also an effective technology for monitoring student performance as students can share, journalise or blog their responses and receive teacher or peer feedback (0.73 effect size). Some examples of this are below.

Example 1 – student responses are recorded in an online journal instead of their notebook. This way, the teacher has access to all student notebooks for monitoring purposes.
Example 2 – Groups of students can be assigned their own project space to record activities and responses. This includes group wiki, blog, email, files and documents.

Example 3 – Students can respond in a class blog and then their peers can see their response and give feedback.

Example 4 – in this example, groups can respond in a blog and also share on a Padlet.

21st Century Skills

Critical thinking
As part of the Technologies learning area, students do have opportunities for:
- problem-solving using the problem-solving process
- analytical thinking, such as formulating algorithm and program structures
- decision-making by making informed choices and justified recommendations
- intellectual flexibility by being open to alternative ideas and new learning
Creative thinking
As part of the Technologies learning area, students do have opportunities for:
- generating and applying new information and ideas to create and identify strategies to develop innovative solutions
- using innovation to identify new ways of doing things and opportunities to reimagine solutions
- demonstrating initiative and enterprise to be self-directed in learning and problem solving
- demonstrating curiosity and imagination to motivate learning in technologies contexts
- synthesising information and ideas to create new understanding
- evaluating and refining ideas and solutions to identify alternative possibilities and make new links to knowledge

Communication
As part of the Technologies learning area, students do have opportunities for:
- using and manipulating effective oral, written and visual communication
- using specialised language, terminology, symbols, diagrams and texts to communicate technologies information and ideas effectively with diverse audiences in a range of contexts

Collaboration and teamwork
As part of the Technologies learning area, students do have opportunities for:
- relating and interacting with others to solve problems in technologies contexts
- recognising and using diverse perspectives to determine the influences and personal, social and economic impacts of technologies contexts
- participating and contributing to create personal, team and community connections

Personal and social skills
As part of the Technologies learning area, students do have opportunities for:
- developing personal, social, ethical, economic and legal understandings in technologies contexts
- demonstrating adaptability and flexibility to create solutions in a range of technologies contexts
- developing the ability to self-manage time and planning during problem-solving
- developing and enhancing the personal characteristics of resilience, mindfulness, open- and fair-mindedness, and self-awareness during problem-solving

How: Collaboration, Teamwork, Personal and Social Skills
I have placed some resources that may be handy in Appendix A at the end of this document. These are lifted straight from my PBL guide, which has much more guidance.

information & communication technologies (ICT) skills
As part of the Technologies learning area, students do have opportunities for:
- accessing, collating, evaluating, analysing and presenting information from primary and secondary sources

- being productive users of information and communication technologies to manipulate digital information to ascertain trends, patterns or relationships and effectively communicate development of solutions to a specified audience.

**Pair Programming**

Pair programming is a collaborative learning method in which students program in pairs instead of individually. This models the real world and has been shown to improve programming competence.

During pair programming, students work in tandem at one computer while completing regular programming assignments. The “driver” controls the mouse and keyboard while the “navigator” makes suggestions, points out errors, and asks questions. The partners routinely switch roles to gain the benefits of each role.

For all processes, see: [Pair Programming-in-a-Box: The Power of Collaborative Learning](https://support.code.org/hc/en-us/articles/115002122788-How-does-pair-programming-within-Code-Studio-work)


**Hackspace configuration**

Currently, our computer labs are designed for maximum efficiency of placing 28 computers in a room.

![Hackspace configuration diagram](image)

This configuration does not work very well, as students need to physically turn to see the screen and teacher; which many are not inclined to do. This is not very workable for Explicit Instruction, where students need to focus on the teacher during the ‘I Do’ and ‘We Do’ segments.
A better configuration for Explicit Instruction is the classic:

With this configuration, students can face the screen and the teacher for the ‘I Do’ segment. The teacher can also choose to go to the back of the room for the ‘We Do’ segment; or it might work better for them to always teach from the back of the room to see student computer screens. With Pair Programming, students can be paired up next to each other and can form a group of four for larger teamwork activities. At the end of the day, students are assessed individually, so this is why a ratio of 1:1 is the bottom line.

The above configuration does not lend itself to more active projects where students are working in teams with hardware such as robots. In these situations, students need more shared desk space and easy access to iteratively prototype their solutions in a larger open space within the classroom. I have seen good setups with large round tables that accommodate 4 computers and 8 students each (1:2 ratio). These are also stand-up heights. Something similar could be achieved with rectangular tables.
In some situations, teams of 4 can be formed by combining pair programming pairs. It is advised to do this sparingly, because we need a growth mindset and well developed enterprise ‘soft skills’ before this works well. Teams of 4 are ok for discussions and brainstorming as part of ‘we do’. However, it becomes complicated to get evidence of individual achievement unless it is a very large project. Eg collecting large data set from a diverse audience, designing multiple screens, connecting multiple complex systems, all needing their own algorithms and coding.

**Evaluating ‘Soft Skills’**
Currently, there are no standards to assess these 21st Century skills or even Growth Mindset behaviours: Taking on Challenges; Learning from Mistakes; Accepting Feedback and criticism; Practice and Applying Strategies; Perseverance (focus on task); Asking Questions; Taking Risks. However, you can have students reflect on these as part of the Evaluate and refine part of the Problem Solving process; which is assessed. Below is an example of an organiser that you could use.

### Evaluation

#### Problem Solving Process Evaluation

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes/Part/No</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EXPLORE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The problem was thoroughly/effectively/appropriately/variably described from the user’s perspective because...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The problem was thoroughly/effectively/appropriately/variably solved within these recognized constraints: ....</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing solutions to similar problems were thoroughly/discerningly/effectively/appropriately/variably analyzed to identify possible solutions. The .... was the basis for the solution because...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The relationships between users, solutions and the components of solutions in similar problems was thoroughly/discerningly/effectively/appropriately/variably understood. This was because of ...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## DEVELOP

The solution to the problem was thoroughly/ discerningly/ effectively/ appropriately/ variably visualized with creative skill to represent and communicate ideas, by....

Components of the solution were thoroughly/ discerningly/ effectively/ appropriately/ variably tested with conceptual models, using...

## GENERATE

The solution was thoroughly/ discerningly/ effectively/ appropriately/ variably constructed, with the components of the preferred solution, using ...

The constructed solution was thoroughly/ discerningly/ effectively/ appropriately/ variably refined in response to alpha testing. The main refinement was...because...

## EVALUATE AND REFINE

In comparison, the final solution was better/ more effective/ closer to the intention than the first attempt because ...

An appraisal of testing data shows....This was used to improve the solution by...

The criteria for assessing the components of the solution and the final solution were:...

Criteria 1

Criteria 2

Criteria 3
In future, it is recommended that the solution be refined further by:...

This will ensure that...

### 21st Century Personal Skills

<table>
<thead>
<tr>
<th>Practice</th>
<th>Things to Celebrate</th>
<th>Things to Work On</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problem Solving</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• What was the problem you were trying to solve? Did your product solve the problem?</td>
<td></td>
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</tr>
<tr>
<td>• What goals for the solution did you have? Did you achieve them?</td>
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</tr>
<tr>
<td>• If you had to solve this problem again, what would you do differently?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Was using the problem solving process useful? Why/Why not?</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Persistence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do you have little persistence on learning goals and tasks and give up at the first sign of trouble?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do you persevere if you are prompted and supported by teachers and peers? If you are not provided with strategies to overcome obstacles, you stop or give up.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Do you persist and “stick with it” and keep working until the task is complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Creativity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• In addition to typical sources, did you find unusual ways or places to get information (adult, expert, community member, business or organization, literature)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Did you use idea-generating techniques (ideation) to develop several original ideas for product(s)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Did you use ingenuity and imagination, going outside conventional boundaries, when shaping ideas into a product</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Did you include elements in your presentation that are especially fun, lively, engaging, or powerful to the particular audience?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Was your solution or product new, unique, surprising; showing a personal touch?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Did you successfully break rules and conventions, or use common materials or ideas in new, clever and surprising ways?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Was your solution or product useful and valuable; did it solve the defined problem or meets the identified need?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice</td>
<td>Things to Celebrate</td>
<td>Things to Work On</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>• Is your solution or product well crafted, striking, designed with a distinct style but still appropriate for the purpose?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Collaboration**

• Did you take responsibility and complete tasks without being asked by your team?
• Did you offer to help others do their work if needed?
• Did you acknowledge and respect other perspectives; and disagree diplomatically?
• Did you follow team rules for collegial discussions, decision-making, and conflict resolution?
• Did your team set a task schedule and track progress toward goals and deadlines?
• Did you develop ideas and create products with involvement of all team members; tasks done separately were brought to the team for critique and revision?

**Communication**

• Did you present information, findings, arguments and supporting evidence clearly, concisely, and logically; audience can easily follow the line of reasoning?
• Did you select information, develop ideas and use a style appropriate to the purpose, task, and audience?
• Did you keep eye contact with audience most of the time; only glancing at notes or slides, during your presentation?
• Did you speak loudly enough for everyone to hear; change tone and pace to maintain interest, during your presentation?
• Did you use well-produced audio/visual aids or media to enhance understanding of findings, reasoning, and evidence, and to add interest?
• Did all team members participate for about the same length of time?

What could all this look like?

Where the summative assessment is an Examination
- This would be a sequence of Critical Content; that probably stacks.
- There would be formative tasks that are aligned to the summative tasks in the Examination. Tasks would provide opportunities for critical and creative thinking.
- Students would respond and communicate their learning in journals, blogs and other web 2.0 technologies. They would also receive feedback from both teachers and peers.
- Students would form **teams** and partnerships to **collaborate** on tasks and activities.
- Students would have opportunities to develop **social skills** and self-manage their learning online.
- Students would use Pair Programming to **collaborate** in their learning.

**Where the summative assessment is an Investigation or Project**

- The learning would be sequenced to follow the Problem Solving Process, using **critical and creative thinking**.
- Each stage of the Problem Solving Process would have a formative practice task, with feedback leading to a summative assessment task.
- Students would form **teams** and partnerships to **collaborate** on tasks and activities associated with their investigation or project.
- Students would **communicate** their solutions with multimodal responses.
- Students **teams** would developing the ability to self-manage time and planning during problem-solving.
- Working in **teams**, developing and enhancing the **personal characteristics** of resilience, mindfulness, open- and fair-mindedness, and self-awareness during problem-solving.
Teambuilding: Getting acquainted
There are numerous activities that your teams can perform, in order to get to know each other. These can be found from pg 10.4 onwards in KAGAN COOPERATIVE LEARNING. I recommend the Team Profile Flashcards on pg 10.11. Otherwise, the sheet below is a good one. Have students fill in their sheet and then take turns sharing with their teammates.
Teambuilding: Team Identity
A big part of creating a cohesive team is for the team to form a team identity via a team name. Do this by following the strategy on pg 10.13 of KAGAN COOPERATIVE LEARNING. I recommend the Jot Thoughts (pg 6.40) and Sum-the-Ranks combination.

Jot Thoughts...

1.) Teacher names a topic, sets a time limit, and provides think time.

2.) Students write and announce as many ideas as they can in the allotted time, one idea per slip of paper.

3.) Each slip of paper is placed in the center of the table; students attempt to cover the table (no slips are to overlap).

What to do with your Teamname?

Having established a teamname, teams can now label their file folder and fill in documentation templates that require a teamname. They could also create a team banner and post it above their project space or even 3D Print a Nameplate. These are very useful for the teacher to remember the names of teams.

---

**Sum-the-Ranks**

Sum-the-Ranks provides everyone with equal input into the decision. It’s a convergent decision making process that can be used after a divergent process, such as Jot Thoughts, in order to judge the merit of ideas. Sum-the-Ranks gathers input from everyone and identifies a mathematical best choice.

**Steps**

1. Participants are provided with, or have created, a list of alternatives.

2. Each team member ranks the items from the top choice to the last choice. (The top choice gets the highest number.)

3. In teams, ranks are summed for each alternative.

4. Representatives from each team post their sums.

5. Team scores are totaled and the item with the highest score is selected.

---

[Source: https://www.kaganonline.com/free_articles/blacklines/BKCM_pg_11_48.gif]
Teambuilding: Team Contract
Have each team write and sign a contract that spells out their agreements about working together, and the steps to be taken when they don’t. The following pages have resources that you can use. Have students read each and then use a round-robin strategy to develop the contract, by having students provide an undertaking (We all promise to _____ )
**Forming: teamwork expectations/norms**

Develop clear criteria for teamwork. Create a collaboration rubric or another list of expectations/norms. Post guidelines on the classroom wall. *Use this as part of their summative assessment.*

<table>
<thead>
<tr>
<th>Teamwork Behaviours Standards</th>
<th>Individual Performance</th>
<th>Below Standard</th>
<th>Approaching Standard</th>
<th>At Standard</th>
<th>Above Standard</th>
</tr>
</thead>
</table>
| Takes Responsibility for Oneself | - is not prepared, informed, and ready to work with the team  
- does not use technology tools as agreed upon by the team to communicate and manage project tasks  
- does not do project tasks  
- does not complete tasks on time  
- does not use feedback from others to improve work | - is usually prepared, informed, and ready to work with the team  
- uses technology tools as agreed upon by the team to communicate and manage project tasks, but not consistently  
- does some project tasks, but needs to be reminded  
- completes most tasks on time  
- sometimes uses feedback from others to improve work | - is prepared and ready to work; is well informed on the project topic and cites evidence to probe and reflect on ideas with the team  
- consistently uses technology tools as agreed upon by the team to communicate and manage project tasks  
- does tasks without having to be reminded  
- completes tasks on time  
- uses feedback from others to improve work | - | - |
<table>
<thead>
<tr>
<th>Helps the Team</th>
<th>[\text{Below Standard}]</th>
<th>[\text{Approaching Standard}]</th>
<th>[\text{At Standard}]</th>
<th>[\text{Above Standard}]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• does not help the team solve problems; may cause problems</td>
<td>• cooperates with the team but may not actively help it solve problems</td>
<td>• helps the team solve problems and manage conflicts</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
<tr>
<td>• does not ask probing questions, express ideas, or elaborate in response to questions in discussions</td>
<td>• sometimes expresses ideas clearly, asks probing questions, and elaborates in response to questions in discussions</td>
<td>• makes discussions effective by clearly expressing ideas, asking probing questions, making sure everyone is heard, responding thoughtfully to new information and perspectives</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
<tr>
<td>• does not give useful feedback to others</td>
<td>• gives feedback to others, but it may not always be useful</td>
<td>• gives useful feedback (specific, feasible, supportive) to others so they can improve their work</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
<tr>
<td>• does not offer to help others if they need it</td>
<td>• sometimes offers to help others if they need it</td>
<td>• offers to help others do their work if needed</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respects Others</th>
<th>[\text{Below Standard}]</th>
<th>[\text{Approaching Standard}]</th>
<th>[\text{At Standard}]</th>
<th>[\text{Above Standard}]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• is impolite or unkind to teammates (may interrupt, ignore ideas, hurt feelings)</td>
<td>• is usually polite and kind to teammates</td>
<td>• is polite and kind to teammates</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
<tr>
<td>• does not acknowledge or respect other perspectives</td>
<td>• usually acknowledges and respects other perspectives and disagrees diplomatically</td>
<td>• acknowledges and respects other perspectives; disagrees diplomatically</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team Performance</th>
<th>[\text{Below Standard}]</th>
<th>[\text{Approaching Standard}]</th>
<th>[\text{At Standard}]</th>
<th>[\text{Above Standard}]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makes and Follows Agreements</td>
<td>[\text{Below Standard}]</td>
<td>[\text{Approaching Standard}]</td>
<td>[\text{At Standard}]</td>
<td>[\text{Above Standard}]</td>
</tr>
<tr>
<td>• does not discuss how the team will work together</td>
<td>• discusses how the team will work together, but not in detail; may just “go through the motions” when creating an agreement</td>
<td>• makes detailed agreements about how the team will work together, including the use of technology tools</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
<tr>
<td>• does not follow rules for collegial discussions, decision-making and conflict resolution</td>
<td>• usually follows rules for collegial discussions, decision-making, and</td>
<td>• follows rules for collegial discussions, decision-making, and conflict resolution</td>
<td>[\text{Not applicable}]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organizes Work</td>
<td>Works as a Whole Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• does not discuss</td>
<td>• creates a task list that divides project work among the team, but it may not</td>
<td>• recognizes and uses special talents of each team member</td>
<td></td>
<td></td>
</tr>
<tr>
<td>agreements are being</td>
<td>be in detail or followed closely</td>
<td>• develops ideas and creates products with involvement of all team members; tasks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>being followed</td>
<td>• sets a schedule for doing tasks but does not follow it closely</td>
<td>done separately are brought to the team for critique and revision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• allows breakdowns</td>
<td>• assigns roles but does not follow them, or selects only one “leader” who</td>
<td>• makes some attempt to use special talents of team members</td>
<td></td>
<td></td>
</tr>
<tr>
<td>in team work to happen</td>
<td>makes most decisions</td>
<td>• does most project tasks separately and puts them together at the end</td>
<td></td>
<td></td>
</tr>
<tr>
<td>needs teacher to</td>
<td>• usually uses time and runs meetings well, but may occasionally waste time;</td>
<td>• does not recognize or use special talents of team members</td>
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<tr>
<td>intervene</td>
<td>keeps materials, drafts, notes, but not always organized</td>
<td>• does project tasks separately and does not put them together; it is a collection</td>
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<tr>
<td></td>
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<td>of individual work</td>
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|                         | conflict resolution                                                            |                                                                                       |
|                        | • discusses how well agreements are being followed, but not in depth; may      |                                                                                       |
|                        | ignore subtle issues                                                           |                                                                                       |
|                        | • notices when norms are not being followed but asks the teacher for help to  |                                                                                       |
|                        | resolve issues                                                                 |                                                                                       |

|                        | honestly and accurately discusses how well agreements are being followed      |                                                                                       |
|                        | • takes appropriate action when norms are not being followed; attempts to     |                                                                                       |
|                        | resolve issues without asking the teacher for help                            |                                                                                       |
Top 10 Tips to Be a Good Teammate

1. **Be a Team Player.** Being a team player means cooperating and doing what's best for the team. Sometimes that means not getting your way. We work together to set and reach goals everyone can support.

2. **Ask for Help.** Everyone needs help sometimes. Ask for help when you need it. Don’t be afraid to ask your teammates for help if you need it or don’t understand something.

3. **Be a Good Helper.** If a teammate needs help, don’t just give him or her the answer or do the task for him or her. A good helper teaches his or her teammate how to do it so the teammate can do it on their own next time.

4. **Keep the Team on Task.** If the team gets off task, a good teammate politely gets the team back on track. Say, “Come on team, let’s focus on …”

5. **Compliment Teammates.** Compliments make us feel good about ourselves. We like people who give us compliments. Be generous with compliments toward teammates when they do a good job or contribute a good idea.

6. **Have a Positive Attitude.** Be positive and encourage teammates. A bad attitude drags your whole team down. Say things like “We can do it!” Everyone likes a winner, but no one likes a whiner.

7. **Watch Teammates.** Pay attention to your teammates. What can you learn from them? Are they being polite or rude? Copy their positive behaviors and avoid the negative.

8. **Listen to Teammates.** Listen to your teammates and try to understand what they have to say. Get everyone’s opinion. Listening is a form of respect. Plus, you can learn a lot from different ideas. Echo your teammates to show them you listened, “I hear you say …”

9. **Piggyback on Each Other.** If a teammate has a good idea, build on it. Make it better. If you have a good idea, let your teammates add to it and make it better.

10. **Apologize.** Sometimes we get angry or act rude. Apologize for acting badly. Say, “I'm sorry for _______. What I will do next time is _______.” Accept the apologies of your teammates.
**TEAM CONTRACT**

<table>
<thead>
<tr>
<th>Project Name:</th>
<th></th>
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<tbody>
<tr>
<td>Team Members:</td>
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**Our Agreement**

- We all promise to listen to each other’s ideas with respect.
- We all promise to do our work as best as we can.
- We all promise to do our work on time.
- We all promise to ask for help if we need it.
- We all promise to _________________________

If someone on our team breaks one or more of our rules, the team may have a meeting and ask the person to follow our agreement. If the person still breaks the rules, we will ask our teacher to help find a solution.

Date: ____________________________

Team Member Signatures:

_______________________________

_______________________________

_______________________________
Tasks and roles
This activity asks students to come together to consider the different tasks and roles that make up the challenge. Teams will need to engage in negotiation, which calls for them to revisit their teamwork behaviours and their team contract.

Have students read the challenge brief and list all the team/group jobs and tasks that will need to be done. Many of the tasks are individual ones, so instruct students not to include these. However, many of the individual tasks need to be combined into a group product, so someone needs to be responsible for that task. Ask students to write their names under the jobs that they would like to be responsible for.

Ask students to consider whether the number of students who have chosen each role is appropriate for the task. If not, students will need to enter into a process of negotiation, consultatively moving their names from one job to another in order to balance the numbers. You may need to intervene in this process by facilitating discussions and mediating, but the students must make their own decisions.

Team Work Plan
Once tasks and roles have been decided, have students read the challenge brief and scan for checkpoints, milestones and monitoring dates. Then have them fill in the Team Work Plan sheet. In order to delineate tasks that need to be performed by the whole team, a person on the team or individually (for assessment), make sure your task sheet or other scaffolding is very clear on what needs to be done and by whom.

Hopefully, teams have identified the time commitments for learning practical skills in their Team Work Plan. Time constraints may mean that not all team members can learn all the practical skills but only parts. This will need to be negotiated by the team.
# Team Work Plan

**Project Name:**

**Team Members:**

<table>
<thead>
<tr>
<th>Product:</th>
<th>Due:</th>
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<table>
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<tr>
<th>What needs to be done?</th>
<th>Who will do this part? (Team, Individual or Person)</th>
<th>By when?</th>
<th>Status</th>
<th>✔ Done</th>
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Team Meeting Roles

Introduce the idea that, aside from specific jobs and tasks required for completion of the project, there are also roles that team members play which are essential for successful outcomes. Ask students to consider what roles they feel comfortable with, encouraging them to consider several roles for themselves, and explaining that their role within a team may change depending on needs and circumstances. It is also a good idea to rotate roles. Display the Team Roles cards poster below prominently in the class.

**LEADER**

- Provides leadership and direction for the group.
- Leads discussions.
- Make sure that everyone’s ideas are heard and respected.
- Make sure that the group discussion stays on topic, on task and on time.
- Focuses work around the learning task
- Make sure that everyone in the group is performing his or her task.
- Ensure that the group’s task is completed.
- Create an atmosphere of cooperation in the group.

**SOUND BITES:**

- “Let’s hear from _____ next.”
- “That’s interesting, but let’s get back to our task.”
- “We only have 5 minutes left. Let’s see if we can wrap up by then.”

**RECORDER**

- Keeps a public record of the team’s ideas and progress.
- Compiles group members’ ideas on paper or online.
- Make sure that final written assignments reflect the thinking and contributions of everyone in the group.
- Ensure that the final draft of any written assignment is polished and professional.
- Checks to be sure that ideas are clear and accurate.

**SOUND BITES:**

- “I think I heard you say ____; is that right?”
- “How would you like me to write

**QUESTIONER**

- Asks leading questions of the group in order to prompt their thinking.
- Thinks of positives and negatives to the groups ideas and questions these.
- Checks the team to see if anyone has any questions and if so, makes sure that the team attempts to answer them.
- Ask another team for the answer to questions if the team cannot find an answer.
- Asks the teacher for the answer to questions if all other avenues have been exhausted.

**SOUND BITES:**

- “Have we considered doing it differently?”
- “Is everyone clear on what we need to do; any questions?”

**CHECKER**

- Restates the group’s conclusions and responses.
- Checks for clarity of understanding.
- Makes sure that everyone in the team has mastered the task.
- Checks to see that everyone in the team is prepared for tests and exams

**SOUND BITES:**

- “Let’s take it in turns doing a problem while everyone else watches to make sure we know what to do”
- “Let’s each do the next problem alone and see if we come up with the same answer”
Running a meeting
You may need to Teach students how to run meetings, play various roles, use conflict resolution skills and use decision-making strategies. Use the Fishbowl Model to Practice the collaboration skills outlined in the collaboration rubric and team contract. Also, discuss with students running a meeting and decision making strategies:

- Roles – who is doing what
- Goals – why meet? What’s the agenda?
- How to decide – consensus, vote, rank
- Attitudes – responsibility, respect, inclusion etc

Later on, you may need to tackle Conflict Resolution, so consult Kagan Cooperative Learning pg 11.36 onwards.