

# Bremer Blueprint

## Bremer State High School's Whole-school Approach to Pedagogy



*Version 4 – November 2022*

# Refining our whole-school approach to pedagogy

## Version 4

This is the fourth version of Bremer's whole-school approach to pedagogy. In 2022 the school completed a review of version three to determine the efficacy of pedagogical strategies, consider 'what's working' and 'what wasn't' – and develop a systematic structure to articulate the school's desired approach, practices and strategies.

Consultation and feedback processes were conducted with leadership, teaching staff, students and parents across Terms 2, 3 and 4 to ensure the refined approach effectively responds to the needs of the community while explicitly underpinning defined practices by a rigorous evidence-base, including peer-reviewed educational research and policy. An attempt has been made to consolidate effective practices from across the school into a coherent structure – expressed as the '*Bremer Blueprint*'.

The review also responded to changes in the latest version of the Queensland Department of Education's P-12 Curriculum, Assessment and Reporting Framework (P-12 CARF) and school review recommendations from 2018.

## Implementation and ongoing review

The implementation of Version 4 of the whole-school approach to pedagogy is subject to ongoing monitoring and evaluation through systematic consultation with leadership, teaching staff, students and parents.

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# Bremer Blueprint

## Structure

Bremer State High School's pedagogical approach is structured into three interrelated parts referred to as the *Bremer Blueprint*:

### **Principles and practices**

Principles and practices are overarching theories, beliefs and techniques that inform effective teaching and learning. Generally, they relate to locally relevant relationship building practices, curriculum design considerations, assessment techniques, instructional approaches and broader affective objectives of learning, such as global citizenship. They are grounded in evidence-based research or policy and linked to the theme/direction of whole school strategy – *a force for good*.

### **Pedagogical model**

The pedagogical model provides a common instructional approach and language to design, plan, implement and discuss a cycle of learning.

### **Bremer High impact teaching strategies (HITS)**

HITS are instructional strategies that are proven to be effective for student learning in our context and can be scaled and resourced across the whole school. Their efficacy is supported by significant educational research and practice.

## Principles and practices

Principles	Practices							
1.0 Promote a positive culture of learning	1.1 Build positive relationships with students by using the language of PRIDE to develop and manage behaviour	1.2 Advocate that all students have the right to learn and can with the right challenge and support	1.3 Have high expectations for every student to promote intellectual engagement and self-regulation	1.4 Allow student voice, interests, strengths and choice to guide learning where possible				
2.0 Precision in curriculum and pedagogy	2.1 Collaboratively plan and sequence the intended curriculum and assessment to engage and challenge all students	2.2 Design learning experiences that explicitly deepen levels of thinking, skill development and self-regulation through scaffolded instruction	2.3 Select, plan and use a range of assessment and feedback techniques to make learning progress visible for students	2.4 Use evidence of student learning progress to differentiate practice, make adjustments and modify instruction	2.5 Leverage digital technologies to personalise learning for students	2.6 Integrate literacy skill development into the enacted curriculum	2.6 Integrate effective approaches to numeracy-based and mathematical problems into the enacted curriculum	
3.0 Grow our learning community	3.1 Foster global citizenship by embedding real-world contexts, environments and problems into learning that are meaningful to students' lives	3.2 Include parents, carers, community members and learning partners						

## Principle 1: Promote a positive culture of learning

Our culture of learning is the sum of what we say and do inside and outside the classroom. By being deliberate in how we collectively promote a positive culture of learning, we can create an environment where all students:

- **Believe** that they have the right and ability to learn.
- **Strive** to improve through perseverance.
- **Achieve** goals set at the right level of challenge.

### Summary of Principle 1 practices

#### **1.1 Build positive relationships with students by using the language of PRIDE to develop and manage behaviour**

- 1.1.1 Teachers use the language of PRIDE and the Bremer behaviour matrix to teach and model productive learning behaviours
- 1.1.2 Teachers use Essential Skills of Classroom Management (ESCMs) to manage behaviour

#### **1.2 Advocate that all students have the right to learn and can with the right challenge and support**

- 1.2.1 Teachers foster a growth mindset in students

#### **1.3 Have high expectations for every student to promote intellectual engagement and self-regulation**

- 1.3.1 Teachers convey and sustain high expectations for learning, effort and behaviour
- 1.3.2 Teachers co-construct aspirational learning goals with students
- 1.3.3 Teachers scaffold and differentiate learning so all students can progress

#### **1.4 Allow student voice, interests, strengths and choice to guide learning where possible**

- 1.4.1 Teachers empower students to have a voice in the development of learning experiences
- 1.4.2 Teachers co-design opportunities for students to exercise agency over their learning

## Practice 1.1 | Build positive relationships with students by using the language of PRIDE to develop and manage behaviour

### Quote:

"Teachers are important agents of socialisation for their students. Teachers' demonstrated values and behaviours are primary influences on student achievement, motivation and learning" (Barni, Russo and Danioni, 2018).

### Theory of practice:

When teachers build positive relationships with students by consistently modelling, acknowledging and managing desired values and behaviours (ie: PRIDE), students are more likely to perceive teachers as credible and recognise the value of productive learning behaviours.

Teacher practices	Actions
1.1.1 Teachers use the language of PRIDE and the Bremer behaviour matrix to teach and model productive learning behaviours	<ul style="list-style-type: none"> <li>• Incorporate the values of PRIDE in teaching and learning, recognise and promote: <ul style="list-style-type: none"> <li>• Perseverance</li> <li>• Respect and Responsibility</li> <li>• Integrity</li> <li>• Diversity</li> <li>• Excellence through engagement</li> </ul> </li> <li>• Teach and model specific behaviours to positively reinforce expectations of student learning, effort and behaviour.</li> </ul>
1.1.2 Teachers use Essential Skills of Classroom Management (ESCMs) to manage behaviour	<ul style="list-style-type: none"> <li>• Set clear expectations for behaviour using the language of expectation: <ul style="list-style-type: none"> <li>• Establishing expectations</li> <li>• Giving instructions</li> <li>• Waiting and scanning</li> <li>• Cueing with parallel acknowledgement</li> </ul> </li> <li>• Use the language of acknowledgement to promote desired behaviour <ul style="list-style-type: none"> <li>• Body language encouraging</li> <li>• Descriptive encouraging</li> </ul> </li> <li>• Use the language of correction to manage undesired behaviour <ul style="list-style-type: none"> <li>• Selecting attending</li> <li>• Redirecting to learning</li> <li>• Giving a choice</li> <li>• Following through</li> </ul> </li> </ul>

### Evidence base:

- Barni, D, Russo, C & Danioni, F. (2017). *Teachers' Values as Predictors of Classroom Management Styles: A Relative Weight Analysis*. *Frontiers in Psychology*. Retrieved from: <https://www.frontiersin.org/articles/10.3389/fpsyg.2018.01970/full>
- Dix, P. (2017). *When the Adults Change, Everything Changes: Seismic Shifts in School Behaviour*. Independent Thinking Press.
- Education Queensland. (2007). *Essential Skills of Classroom Management*. Queensland Government: Brisbane.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Milton Park, UK: Routledge.
- Roorda, D., Koomen, H., Split, J., & Oort, F. (2011). The influence of affective teacher-student relationships on students' school engagement and achievement: A meta-analytic approach. *Review of Educational Research*, vol. 81, no. 4, pp. 493-529.

## Practice 1.2 | Advocate that all students have the right to learn and can with the right challenge and support

### Quote:

"It's not always the people who start out the smartest who end up the smartest" (Dweck, 2007).

### Theory of practice:

Research shows that both intelligence and motivation are malleable. When teachers help students understand that they have the right to learn, and can acquire new skills and improve existing skills through effort, regardless of past achievement, it increases their motivation to try.

People with a fixed mindset—those who believe that abilities are fixed—are less likely to flourish than those with a growth mindset—those who believe that abilities can be developed. By praising students for their effort (perseverance), rather than achievement (grades and marks), they are more likely to see their abilities as malleable and develop a positive disposition toward learning.

Furthermore, when teachers teach students to understand the neuroscience behind learning and to embrace challenge, they demonstrate greater confidence, resilience and creativity.

Teacher practices	Actions
1.2.1 Teachers foster a growth mindset in students	<ul style="list-style-type: none"><li>• Teach students about the brain's 'malleability' and 'neuroplasticity' - the brain needs to be trained like a muscle through habits</li><li>• Encourage engagement with challenging tasks</li><li>• Use the word "yet" when students make 'fixed' statements. Eg: When told "I can't do fractions", respond "you haven't solved this fraction, yet"</li><li>• Promote mistakes as learning opportunities, eg: "what a wonderful mistake"</li><li>• Avoid praising intelligence, it reinforces the idea that intelligence is a fixed trait</li><li>• Promote complexity, challenge and collaboration as more desirable than the memorisation and reproduction of declarative knowledge</li></ul>

### Evidence base:

- Dweck, C. (2007). *Mindset: The New Psychology of Success*. Ballantine Books: New York, NY
- Dweck, C. (2014). *Developing a growth mindset*. Retrieved from: <https://www.youtube.com/watch?v=hiiEeMN7vbQ>
- Nottingham, J. (2016). *James Nottingham's Learning Challenge (Learning Pit) animation*. Retrieved from: <https://www.youtube.com/watch?v=3IMUAOhuO78>
- Nottingham, J. (2017). *The Learning Challenge: How to Guide Your Students Through the Learning Pit to Achieve Deeper Understanding*. Corwin: USA.



## Practice 1.3 | Have high expectations for every student to promote intellectual engagement and self-regulation

### Quote:

"Our role [as teachers] is not to enable students to reach their potential, or to meet their needs; our role is to find out what students can do, and make them exceed their potential and needs" (Hattie, 2012).

### Theory of practice:

When teachers model and sustain high expectations as part of their regular classroom practice, students' intrinsic motivation to achieve is lifted, they are more likely to take intellectual risks.

Teacher practices	Actions
1.3.1 Teachers convey and sustain high expectations for learning, effort and behaviour	<ul style="list-style-type: none"><li>• Communicate high expectations about all aspects of school</li><li>• Emphasise the quality of learning with the valuing of effort</li><li>• Ensure all students understand the standards expected of them</li><li>• Provide constructive feedback and challenges for students to further their learning</li></ul>
1.3.2 Teachers co-construct aspirational learning goals with students	<ul style="list-style-type: none"><li>• Ensure learning goals are developed at the right level of challenge (zone of proximal development) for each student</li><li>• Support students to identify and build on strengths</li></ul>
1.3.3 Teachers scaffold and differentiate learning so all students can progress	<ul style="list-style-type: none"><li>• Ensure assessment practices support students to improve</li><li>• Provide a range of strategies, tools and rubrics for students to self-evaluate and self-assess their progress</li></ul>

### Evidence base:

- Donker, A.S., de Boer, H., Kostons, D., Dignath van Ewijk, C.C., & van der Werf, M.P.C. (2014). Effectiveness of learning strategy instruction on academic performance: A meta-analysis. *Educational Research Review*, vol. 11, pp. 1-26.
- Education Endowment Foundation. (2015). *Teaching and Learning Toolkit – Australia*. Retrieved 22 September 2017 from the Evidence for Learning website.
- Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Milton Park, UK: Routledge.

## Practice 1.4 | Allow student voice, interests, strengths and choice to guide learning where possible

### Quote:

"One of the most powerful tools available to influence academic achievement is helping students feel they have a stake in their learning" (Toshalis and Nakkula, 2012).

### Theory of practice:

When students are empowered as learners and leaders, actively contributing to both their own education and to whole school initiatives, their self-efficacy is enhanced and they experience significant growth in motivation, wellbeing and achievement.

By allowing students to demonstrate what they know and can do through their preferred topic, assessment technique or mode of response, you reduce their cognitive load spent on lower-order content and skill development and provide an opportunity for them to demonstrate more higher-order critical and creative thinking.

Teacher practices	Actions
1.4.1 Teachers empower students to have a voice in the development of learning experiences	<ul style="list-style-type: none"><li>• Consider the backgrounds, interests and needs of students to create authentic and meaningful learning opportunities.</li><li>• Involve students in curriculum planning</li><li>• Provide options for choice of topic, assessment technique or mode of response</li></ul>
1.4.2 Teachers co-design opportunities for students to exercise agency over their learning	<ul style="list-style-type: none"><li>• Assist students to take ownership of their learning by identifying strategies that support them to attain learning goals</li><li>• Use student strengths to enable them to become increasingly self-directed over time, and to gain confidence in their ability to complete learning tasks</li></ul>

### Evidence base:

- Bill & Melinda Gates Foundation. (2013). *Ensuring fair and reliable measures of effective teaching: Culminating findings from the MET Project's three-year study*. Seattle: Bill & Melinda Gates Foundation. Retrieved 22 September 2017 from: <http://www.edweek.org/media/17teach-met1.pdf>
- Nagaoka, J., Farrington, C.A., Ehrlich, S.B., Heath, R.D., Johnson, D.W., Dickson, S., Turner, A.C., Mayo, A., & Hayes, K. (2015). *Foundations for young adult success: A developmental framework*. Chicago: University of Chicago, Consortium on Chicago School Research.
- Quaglia, R., & Corso, M. (2014). *Student voice: the instrument of change*. London: SAGE Publications Ltd., p.3.
- Toshalis, E., & Nakkula, J. (2012). *Motivation, engagement, and student voice. Students at the Centre Series*. Boston: Jobs for the Future.
- You, S., Hong, S., & Ho, H. (2011). Longitudinal effects of perceived control on academic achievement. *The Journal of Educational Research*, vol. 104, no. 4, pp. 253-266.
- Warin, J. (2015). Identity capital: An application from a longitudinal ethnographic study of self-construction during the years of school. *British Journal of Sociology of Education*, vol. 36, no. 5, pp. 689-706.

## Principle 2: Precision in curriculum and pedagogy

Teachers are experts in learning. As professionals, we strive for precision in the development and delivery of curriculum – both written and enacted. When we ensure that learning experiences are fit-for-purpose and meet the needs and aspirations for our students, we are ensuring *all students are succeeding*.

### Summary of Principle 2 practices

#### **2.1 Collaboratively plan and sequence the intended curriculum and assessment to engage and challenge all students**

- 2.1.1 Teachers place students at the centre of curriculum planning and sequencing of learning
- 2.1.2 Teachers collaboratively design and implement a scope and sequence of learning
- 2.1.3 Teachers collaboratively review and update learning programs

#### **2.2 Design learning experiences that explicitly deepen levels of thinking, skill development and self-regulation through scaffolded instruction**

- 2.2.1 Teachers provide opportunities for focused instruction
- 2.2.2 Teachers provide opportunities for guided instruction
- 2.2.3 Teachers facilitate opportunities for collaborative learning
- 2.2.4 Teachers facilitate opportunities for independent learning

#### **2.3 Select, plan and use a range of assessment and feedback techniques to make learning progress visible for students**

- 2.3.1 Teachers promote the value in giving and receiving feedback
- 2.3.2 Teachers use a range of feedback techniques
- 2.3.3 Teachers use diagnostic assessment data and information
- 2.3.4 Teacher provide effective feedback

#### **2.4 Use evidence of student learning progress to differentiate instruction by making adjustments and modifications**

- 2.4.1 Teachers adopt a flexible approach to curriculum delivery
- 2.4.2 Teachers differentiate content
- 2.4.3 Teachers differentiate processes

2.4.4 Teachers differentiate products

2.4.5 Teachers differentiate environment

**2.5 Leverage digital technologies to personalise learning for students**

2.5.1 Teachers assess their own technical knowledge and capabilities

2.5.2 Teachers create opportunities for digital innovation

2.5.3 Teachers develop effective digital learning routines

2.5.4 Teachers use assistive technologies

**2.6 Integrate the development of literacy skills into the enacted curriculum**

2.6.1 Teachers prioritise disciplinary literacy through targeted vocabulary instruction in every learning area

2.6.2 Teachers develop students' ability to read complex academic texts

2.6.3 Teachers break down complex writing tasks during composition phase of learning

2.6.4 Teachers unpack assessment expectations prior to summative tasks

**2.7 Integrate effective approaches to numeracy-based and mathematical problems into the enacted curriculum**

2.7.1 Teachers model and teach visualisation techniques

2.7.2 Teachers model and teach approximation

2.7.3 Teachers model and teach close reading

## Practice 2.1 | Collaboratively plan and sequence the intended curriculum and assessment to engage and challenge all students

### Quote:

"What you teach is as important as how you teach it, and the better your teaching craft, the greater the benefits resulting from a choice of rigorous content" (Lemov, 2015).

### Theory of practice:

When teachers collaborate to consider students' needs and interests, study the intended curriculum and agree on priorities, they ensure what's taught is meaningful, viable and reinforced. When new content, skills or processes cannot be effectively assessed through checking for understanding (formative or summative), they are no longer viable or meaningful for the program or unit of work.

Teacher practices	Actions
2.1.1 Teachers place students at the centre of curriculum planning and sequencing of learning	<ul style="list-style-type: none"><li>Analyse student data to design learning programs with multiple entry points that engage students at their level of prior knowledge, skills and capabilities</li><li>Design programs or units of work that are developmental and scaffolded to meet student needs</li><li>Prioritise content, skills and processes that will engage students through opportunities for choice, interests or use of strengths</li></ul>
2.1.2 Teachers collaboratively design and implement a scope and sequence of learning	<ul style="list-style-type: none"><li>Study Australian Curriculum learning area achievement standard aspects and content descriptors, QCAA subject syllabus content and objectives OR course competencies to discuss and agree on priorities for the allotted program length</li><li>Ensure agreed priorities are supported by instructional strategies, including teaching of cognition (using cognitive verbs) and checking for understanding opportunities</li><li>Identify when formative and summative assessment practices take place</li><li>Develop quality summative assessment that is valid, accessible and reliable, and assesses what is planned to be taught and reinforced</li></ul>
2.1.3 Teachers collaboratively review and update learning programs	<ul style="list-style-type: none"><li>Discuss and document the strengths and weaknesses of programs and units of work</li><li>Ensure alignment with school learning area year level/band plans, QCAA syllabus requirements or required competencies</li></ul>

### Evidence base:

- Coe, R., Aloisi, C., Higgins, S., & Major, L.E. (2014). *What makes great teaching? Review of the underpinning research*. London: The Sutton Trust. Retrieved 27 September 2017 from the Durham University website
- Lemov, D. (2015). *Teach like a champion 2.0*. San Francisco, CA: Jossey-Bass, p. 84-85.
- QCAA. (2018). *Attributes of quality assessment*. Retrieved from: <https://www.qcaa.qld.edu.au/about/k-12-policies/student-assessment/understanding-assessment/attributes-quality-assessment>
- QCAA. (2018). *Glossary of cognitive verbs*. Retrieved from: [https://www.qcaa.qld.edu.au/downloads/senior-qce/common/snr\\_glossary\\_cognitive\\_verbs.pdf](https://www.qcaa.qld.edu.au/downloads/senior-qce/common/snr_glossary_cognitive_verbs.pdf)

## Practice 2.2 | Design learning experiences that explicitly deepen levels of thinking, skill development and self-regulation through scaffolded instruction

### Quote:

"Teachers can intentionally increase students' ownership of learning over time" (Fisher and Frey, 2013).

### Theory of practice:

When teachers design learning experiences to intentionally shift cognitive work from teacher modelling, to joint responsibility between teachers and students, to independent practice and application by the learner, we support students to deepen their levels of thinking, develop automaticity and self-regulate.

By using a common instructional strategy, we provide a system of expectations for how students might be taught. This foundation supports teachers to design learning and make informed decisions about the specific strategies that will best support their students' success.

Teacher practices	Actions
2.2.1 Teachers provide opportunities for focused instruction	<ul style="list-style-type: none"><li>• Establish the purpose for learning</li><li>• Refer to and describe the learning goal</li><li>• Note the relevance of the lesson</li><li>• Think aloud, demonstrate or provide direct instruction</li><li>• Clarify how to be successful</li></ul>
2.2.2 Teachers provide opportunities for guided instruction	<ul style="list-style-type: none"><li>• Scaffold the development of knowledge, skills, processes or capabilities – differentiate</li><li>• Use questions, prompts, worked examples or cues to support student learning progress, without telling them answers</li><li>• Document student responses with opportunities for teacher, peer or self-assessment and feedback</li><li>• Use evidence of learning to differentiate instruction into groups of similar or mixed abilities</li></ul>
2.2.3 Teachers facilitate opportunities for collaborative learning	<ul style="list-style-type: none"><li>• Form purposeful groups and assign roles</li><li>• Facilitate sharing, encourage opinions, ideas and thoughts</li><li>• Consolidate and document thinking from different perspectives</li><li>• Support problem solving and using argumentation to justify positions</li><li>• Clarify misunderstandings</li></ul>
2.2.4 Teachers facilitate opportunities for independent learning	<ul style="list-style-type: none"><li>• Support students to independently apply information, ideas, content, skills and strategies in novel situations</li><li>• Provide resources and tools for guidance and self-assessment (eg: rubrics, checklists, learning progressions or proficiency scales)</li><li>• Monitor student progress and provide individual feedback</li></ul>

### Evidence base:

- Fisher, D., & Frey, N. (2013). *Better learning through structured teaching: A framework for the gradual release of responsibility* (2nd ed.). Alexandria, VA: ASCD.

## Practice 2.3 | Select, plan and use a range of assessment and feedback techniques to make learning progress visible for students

### Quote:

“A challenge of feedback given, is that it is not often received. When giving feedback, reflect on whether we are fixing the work or improving the learner” (Brooks, 2021).

### Theory of practice:

When teachers are deliberate in their selection, planning and use of assessment techniques to make learning progress visible, they promote a culture of feedback that drives learning forward. Research on feedback has established:

- Feedback is powerful but variable in its impact on learning.
- Grades, marks or comments with no focus on improvement might interfere with learning.
- Students prefer immediate feedback, but delayed feedback can be beneficial.
- Prior knowledge is the starting point for feedback.
- Feedback is about closing the gap between current and desired learning.
- High self-efficacy and trust are needed for feedback to be effective.
- Student to teacher feedback is more important than teacher to student.
- Effective feedback occurs when it is received and acted upon.

Teacher practices	Actions
2.3.1 Teachers promote the value in giving and receiving feedback	<ul style="list-style-type: none"><li>• Discuss the importance of feedback</li><li>• Involve students in self-assessment</li><li>• Emphasise individual progress, rather than comparison (grades/marks)</li><li>• Promote a growth mindset and proactively address fixed mindset behaviours (eg: blame, poor self-talk, hopelessness, helplessness, non-compliance)</li></ul>
2.3.2 Teachers use a range of feedback techniques	<ul style="list-style-type: none"><li>• Use prior knowledge lessons starters/warm ups</li><li>• Clarify learning goals and 'criteria of success' through modelled examples, proficiency scales, learning progressions, rubrics or checklists</li><li>• Provide in-lesson verbal feedback</li><li>• Facilitate student-to-teacher feedback</li><li>• Use teacher-to-student and student-to-student feedback</li><li>• Provide post-lesson feedback</li></ul>
2.3.3 Teachers use diagnostic assessment data and information	<ul style="list-style-type: none"><li>• Create diagnostic assessments to evaluate students' prior knowledge or capability in specific aspects of achievement standards, content descriptors, cognitive processes or syllabus objectives</li><li>• Evaluate systematic diagnostic data to inform teaching, including NAPLAN and PAT data (Reading, Writing and Mathematics).</li></ul>
2.3.4 Teachers provide effective feedback	<p>Provide effective feedback by:</p> <ul style="list-style-type: none"><li>• Beginning with clear and specific goals</li><li>• Encouraging self-reflection in relation to set goals</li><li>• Avoiding comparisons between students</li><li>• Ensuring feedback is formative/can be actioned</li><li>• Providing feedback in a timely manner</li><li>• Referring to progress rather than ability</li><li>• Using goal-referenced comments or criteria, rather than marks or grades</li><li>• Identifying areas of success and areas for improvement</li></ul>

#### Evidence base:

- Brooks, C., et.al. (2021). From fixing the work to improving the learner: An initial evaluation of a professional learning intervention using a new student-centred feedback model. *Studies in Educational Evaluation: ELSEVIER*. doi: [10.1016/j.stueduc.2020.100943](https://doi.org/10.1016/j.stueduc.2020.100943)
- Hattie, J. & Clarke, S. (2019). *Visible Learning: Feedback*. Routledge: New York, NY.
- Sutton, R., Hornsey, M.J., & Douglas, K.M. (Eds., 2011). *Feedback: The communication of praise, criticism, and advice*. Peter Lang Publishing: New York.
- William, D. (2011). *Embedded Formative Assessment - practical strategies and tools for K-12 teachers*. Solution Tree: UK.



## Practice 2.4 | Use evidence of student learning progress to differentiate practice, make adjustments and modify instruction

### Quote:

“In its truest sense, teaching is not finished until learning occurs – for each learner. Teaching without learning is an oxymoron (Tomlinson, 2006).

### Theory of practice:

When teachers use evidence of each students' learning progress to make in-the-moment or planned adjustments and modifications to curriculum content, processes, products or environment, all learners can access and participate in curriculum.

Teacher practices	Actions
2.4.1 Teachers adopt a flexible approach to curriculum delivery	<ul style="list-style-type: none"> <li>• A differentiated classroom is flexible: there are many classroom elements that can be used to promote individual and whole-class success, such as: <ul style="list-style-type: none"> <li>• time</li> <li>• materials</li> <li>• modes of teaching</li> <li>• ways of grouping students</li> <li>• ways of expressing learning</li> <li>• ways of assessing learning.</li> </ul> </li> <li>• Provide choices - choices around content, process, product groups, resources and environment.</li> <li>• Use relevant content - ensure content is meaningful, connected to the learner, and can offer a deep understanding</li> </ul>
2.4.2 Teachers differentiate content	<ul style="list-style-type: none"> <li>• Define what is essential learning</li> <li>• Use pre-assessment to determine where students need to begin, then match students with appropriate activities, some pre-assessment activities include: <ul style="list-style-type: none"> <li>• Student/Teacher conference</li> <li>• K-N-W Chart</li> <li>• What do I Know, Need to know &amp; Want to know</li> <li>• Journal - Write what you know about...</li> <li>• If I say ... What does it make you think of?</li> <li>• Concept map...</li> <li>• pre-test</li> <li>• Student reflection</li> </ul> </li> </ul>
2.4.3 Teachers differentiate processes	<ul style="list-style-type: none"> <li>• Provide varied options for meeting learning goals, such as: <ul style="list-style-type: none"> <li>• tiered activities through which all learners work on building the same important understandings and skills but proceed with different levels of support, challenge or complexity</li> <li>• develop personal agendas (task lists written by the teacher and containing both 'common' work for the whole class and work that addresses the individual needs of learners) to be completed either during specified 'agenda time' or if students complete core work ahead of time</li> <li>• provide access to a variety of materials that target different learning preferences and readiness</li> <li>• develop activities that target auditory, visual and kinaesthetic preferences for task completion</li> </ul> </li> </ul>
2.4.4 Teachers differentiate products	<ul style="list-style-type: none"> <li>• Allow student choice over how they show what they know and can do, by: <ul style="list-style-type: none"> <li>• allowing students to design products around learning intentions/goals in varying modes</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• allowing for varied working arrangements – alone, with a group</li> <li>• providing product assignments at varying degrees of difficulty to extend student technical skills or match readiness</li> </ul>
2.4.5 Teachers differentiate environment	<ul style="list-style-type: none"> <li>• Consider safe changes to the look, feel and layout of the learning environment to meet student needs, interests or physical preferences, such as: <ul style="list-style-type: none"> <li>• developing routines or resources that allow students to get help when teachers are busy with other students and cannot help them immediately</li> <li>• using alternative seating (floor, stools, groups, individual)</li> <li>• identifying classroom management procedures that would make the learning environment safe or more supportive</li> </ul> </li> </ul>

**Evidence base:**

- Department of Education (Queensland). (n.d.). Inclusive Education Policy. Queensland Government: Department of Education.
- Tomlinson, C. A. (2006). Differentiation in practice: A resource guide for differentiating curriculum grades K-12. Alexandria, VA: Association for Supervision and Curriculum Development.

## Practice 2.5 | Leverage digital technologies to personalise learning for students

### Quotes:

"The use of ICT does not force teachers to re-examine or change their current practices concerning teaching and learning. A strong pedagogical practitioner uses ICT to help adopt technologically literate practices and use it effectively in teaching" (Wadmany & Kliachko, 2014, pp.23, 26–27).

### Theory of practice:

When teachers consider how to integrate digital technologies into teaching and learning, they can more efficiently personalise access to learning objectives, methods of instruction, resources, assessment, response types and feedback for students. Technologies used for teaching and learning should be considered an integral part of instruction and not as an object exclusive to itself.

Technological integration in learning and education is an inevitable part of the ever-changing technological world. Leveraging technology is an essential part of every learning mode and part of the Australian Curriculum. Students learn to use ICT effectively and appropriately to access, create and communicate information and ideas, solve problems and work collaboratively in all learning areas at school and in their lives beyond school.

Teacher practices	Actions
2.5.1 Teachers assess their own technical knowledge and capabilities	<ul style="list-style-type: none"><li>• Use the TEPACK model of thinking to plan the appropriate integration of technologies</li><li>• Reflect on how to align your professional technological knowledge, pedagogical knowledge and content knowledge to deliver curriculum</li></ul>
2.5.2 Teachers create opportunities for innovation	<ul style="list-style-type: none"><li>• Use the SAMR model to reflect on the suitability and potential lesson, task or activity design technologies may afford</li><li>• Sequence the integration of learning technologies as part of your planning for learning and assessment</li><li>• Create time and space for the use of innovative instruction, resources, tools and feedback processes, while ensuring technologies do not unacceptably impede on essential learning outcomes</li></ul>
2.5.3 Teachers develop effective digital learning routines	<ul style="list-style-type: none"><li>• Explicitly teach students required technical skills or ICT capabilities to access and engage with curriculum</li><li>• Use Microsoft 365, including OneNote, Teams and/or QLearn as core platforms to deliver curriculum resources and assessment information</li><li>• Explain and clarify clear processes for accessing curriculum and assessment, and the processes for submission of work and receiving feedback via digital platforms</li></ul>
2.5.4 Teachers use assistive technologies	<ul style="list-style-type: none"><li>• Normalise opportunities for students to use assistive technologies to access curriculum and assessment</li><li>• Use Microsoft's Accessibility tools for learning, such as:<ul style="list-style-type: none"><li>• Microsoft Editor</li><li>• Type with your voice (voice to text)</li><li>• Immersive reader</li><li>• Practice reading fluency with the Reading Progress tool (MS Teams)</li><li>• Use the Reading view to hide distracting content from web pages</li><li>• OneNote Math Assistant</li><li>• Present with real-time, automatic captions or subtitles in PowerPoint</li></ul></li></ul>

**Evidence base:**

- Baddeley, S. (2020). TPACK is missing an "e": An exploration of ethical considerations in technology, pedagogy and content knowledge. *Journal of Educational Technology Development and Exchange*, 3(2), 1-13.
- Howell, J. (2016). What is digital pedagogy and why do we need one? *The International Journal of Educational Technology in Higher Education*, 13(1), 1-14.
- Microsoft Support. (2023). Accessibility tools for learning. Retrieved February 12, 2023, from <https://support.microsoft.com/en-us/topic/accessibility-tools-for-learning-a610cc7f-6cd1-49ff-a543-214cdf9a0710>.
- Queensland Department of Education. (n.d.). Qlearn [Intranet]. Retrieved February 12, 2023, from <https://intranet.qed.qld.gov.au/Services/InformationTechnology/e-learning-training/qlearn>
- Sarker, A., Kan, M., & Ali, M. (2019). Leveraging digital technology for better learning and education: A systematic literature review. *Journal of Educational Technology Development and Exchange*, 2(1), 1-14.
- Wadmany, R., & Kliachko, P. (2014). Conceptualizing dimensions and a model for digital pedagogy. *Journal of Educational Technology Development and Exchange*, 7(1), 1-22.

## Practice 2.6 | Integrate literacy skill development into the enacted curriculum

### Quote:

"Overall student academic success in meeting expected appropriate demonstrations of performance will depend very much on how well the student can manage to understand, participate in and respond to the created intersection of the curriculum-literate environment" (Wyatt-Smith & Cumming, 2003, pp. 9).

### Theory of practice:

When teachers explicitly teach curriculum-literacies, students are provided with the opportunity to succeed in all levels of their education as well as their personal, social and employment endeavours. Literacy encompasses the knowledge and skills required to access the curriculum through reading, writing, speaking, viewing and critical thinking. The teaching of literacy must focus on the overarching processes of comprehending and composing texts as a means for developing not only curriculum knowledge but the metalanguage required for subject-specific learning and assessment.

Teacher practices	Actions
2.6.1 Teachers prioritise disciplinary literacy through targeted vocabulary instruction in every learning area	<ul style="list-style-type: none"> <li>• Monitor student understanding and fluency of use of specific terminology and subject-specific vocabulary</li> <li>• Explicit teaching of Tier 2 and Tier 3 words to help students access and use academic language – create a vocabulary list</li> <li>• Deliberate and targeted selection of subject-specific vocabulary that is contextualised through lessons for the purpose of both formative and summative assessment</li> <li>• Plan and implement activities that provide opportunities for immediate literacy-based feedback</li> </ul>
2.6.2 Teachers develop students' ability to read complex academic texts	<ul style="list-style-type: none"> <li>• Provide opportunities for students to activate prior knowledge of a texts' content</li> <li>• Use reading strategies (predictions, visualising) to support student engagement with a subject-specific text</li> <li>• Use targeted questioning techniques to encourage and assess comprehension of a subject-specific text (QAR)</li> <li>• Deconstruct texts to encourage discussions about text elements (word, grammar, text structure, language features and purpose) (Bremer text deconstruction sheets)</li> <li>• Introduce complex texts through modelling and group work before promoting independent reading, particularly for students with low-literacy skills</li> </ul>
2.6.3 Teachers break down complex writing tasks during composition phase of learning	<ul style="list-style-type: none"> <li>• Encourage students through pre-writing activities to ensure they have background knowledge prior to extended writing tasks (eg. writing a summary)</li> <li>• Provide high-quality texts/exemplars that demonstrate the structure and complexity expected in student writing</li> <li>• Provide sentence starters to encourage students to compose texts</li> <li>• Sentence starters should model the cognition students are practising (eg. analysis, interpretation)</li> <li>• Ensure students understand subject-specific Tier 2 and Tier 3 vocabulary</li> <li>• Explicitly teach planning strategies through graphic organisers</li> <li>• Model responses through speaking aloud and explaining the writing process</li> <li>• Monitor and review writing through checklists and exemplars of high-quality responses in the required genre</li> <li>• Motivate students through collaboration, competitions and self-talk</li> </ul>

<p>2.6.4 Teachers unpack assessment expectations prior to summative tasks</p>	<ul style="list-style-type: none"> <li>• Prior to beginning an assessment task, criteria sheets (ISMG / task-specific standards matrix) are viewed by students and explicitly unpacked by teachers</li> <li>• Explicitly teach cognitive skills required for assessment through classroom activities</li> <li>• Provide opportunities for students to practise skills required for summative tasks, rather than teaching the content required for an assessment</li> </ul>
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**Evidence base:**

- Berninger, V., Vaughan, K., Abbott, R., Begay, K., Coleman, K., Curtin, G., Hawkins, J. and Graham, S. (2002). Teaching Spelling and Composition Alone and Together: Implications for the Simple View of Writing. *Journal of Educational Psychology*, 94(2), pp.291-304. Retrieved from <https://irvingtonparentsforum.files.wordpress.com/2015/10/berninger-teaching-spelling-writing-alone-together.pdf>
- Evidence for Learning. (2020). *Improving literacy in secondary schools*. Evidence for Learning: Sydney. Retrieved from <https://evidenceforlearning.org.au/education-evidence/guidance-reports/improving-literacy-in-secondary-schools>
- Wyatt-Smith, C & Cumming, J. (2003). *Curriculum Literacies: Expanding domains of assessment*. Assessment in Education. Retrieved from [https://www.researchgate.net/publication/29457168\\_Curriculum\\_Literacies\\_Expanding\\_domains\\_of\\_assessment](https://www.researchgate.net/publication/29457168_Curriculum_Literacies_Expanding_domains_of_assessment)

## Practice 2.7 | Integrate effective approaches to numeracy-based and mathematical problems into the enacted curriculum

### Quote:

Numeracy will have different meanings for different students, depending on their numeracy experiences at school, at home and in other contexts in which they interact” (Sellars, 2018, p. 24).

### Theory of practice:

When teachers identify numeracy demands across the curriculum, students have opportunities to transfer their mathematical knowledge and skills to contexts outside the mathematics classroom. These opportunities help students recognise the interconnected nature of mathematical knowledge, other learning areas and the wider world, and encourage them to use their mathematical skills broadly.

In the Australian Curriculum, students become numerate as they develop the knowledge and skills to use mathematics confidently across other learning areas at school and in their lives more broadly. Numeracy encompasses the knowledge, skills, behaviours and dispositions that students need to use mathematics in a wide range of situations. It involves students recognising and understanding the role of mathematics in the world and having the dispositions and capacities to use mathematical knowledge and skills purposefully.

Teacher practices	Actions
2.7.1 Teachers model and teach visualisation techniques	<ul style="list-style-type: none"><li>• Demonstrate visualisation during worked examples</li><li>• Show students how to represent mathematical problems with diagrams, pictures, tables, graphs, comics and other graphic displays</li><li>• Guides students from beginning pictures to schematic representations where the image shows the relationship between the data in the problem</li><li>• When problem solving, show students how to draw a diagram to represent the scenario</li></ul>
2.7.2 Teachers model and teach approximation	<ul style="list-style-type: none"><li>• Demonstrate real life applications of estimation to students</li><li>• Encourage students to use estimation to determine the reasonableness of their answers.</li><li>• Provide learning experiences to develop estimation skills where students are required to conceptualise and mentally manipulate numbers, such as:<ul style="list-style-type: none"><li>• place value activities</li><li>• practice rounding up or down to various places, including front end rounding</li><li>• mental arithmetic</li></ul></li><li>• Model estimation with concrete materials (manipulatives)</li></ul>
2.7.3 Teachers model and teach close reading	<ul style="list-style-type: none"><li>• Encourage students to read and highlight text in the question, including:<ul style="list-style-type: none"><li>• Known information</li><li>• What is being solved</li><li>• What maths would help</li></ul></li><li>• Also encourage students to eliminate unnecessary text in the question by crossing it out</li></ul>

### Evidence base:

- Dehaene, S., & Cohen, L. (1995). Towards an anatomical and functional model of number processing. *Mathematical Cognition*, 1(1), 83–120.
- Piggott, J, Woodham, L. (2022) Thinking Through, and By, Visualising. Retrieved from <https://nrich.maths.org/6447>

- Quigley, A (2021) Does Reading Really Matter in Mathematics  
<<https://www.theconfidentteacher.com/2021/04/does-reading-really-matter-in-mathematics/>>
- Rolka, K, Rösken, B (2006) A Picture is Worth A 1000 Words – The Role of Visualisation in Mathematics Learning. Retrieved from <https://www.emis.de/proceedings/PME30/4/457.pdf>
- Malone, S. A., Burgoyne, K., & Hulme, C. (2020). Number knowledge and the approximate number system are two critical foundations for early arithmetic development. *Journal of Educational Psychology*, 112(6), 1167–1182. <https://doi.org/10.1037/edu0000426>
- Sellars, M. (2018). Numeracy in Authentic Contexts. In *Numeracy in Authentic Contexts*. <https://doi.org/10.1007/978-981-10-5736-6>
- Siemann, J., & Petermann, F. (2018). *Innate or Acquired ? – Disentangling Number Sense and Early Number Competencies*. 9(April), 1–13. <https://doi.org/10.3389/fpsyg.2018.00571>
- Siegler, R., & Ramani, G. (2006) Early Development of Estimation Skills  
<<https://www.psychologicalscience.org/observer/early-development-of-estimation-skills>>



## Principle 3: Grow our learning community

Learning doesn't stop outside of the classroom. Effective learning communities inspire people, organisations and systems to come together in pursuit of shared aspirations and to address common challenges. By taking practical steps to grow our learning community, we create opportunities for students to see their efforts as part of something greater than themselves and to make a positive impact on their own and others' lives.

### Summary of Principle 3 practices

#### **3.1 Foster global citizenship by embedding real-world contexts, environments and problems meaningful to students' lives**

- 3.1.1 Teachers support students to explore their role as a global citizen
- 3.1.2 Teachers and students co-design learning that connects to real world contexts
- 3.1.3 Teachers and students collaborate with learning partners in and beyond the school

#### **3.2 Include parents, carers, community members and learning partners**

- 3.2.1 Teachers establish open and sustained communications with parents/carers, community members and partners
- 3.2.2 Teachers seek and use parents'/carers' and community knowledge and feedback
- 3.2.3 Teachers facilitate parent/carer and learning partner involvement in education within the classroom, school and beyond

## Practice 3.1 | Foster global citizenship by embedding real-world contexts, environments and problems meaningful to students' lives

### Quote:

“Education for global citizenship is identified as a key driver of social cohesion at local, national and international levels” (Menzie-Ballantyne, 2021).

### Theory of practice:

When teachers empower students to recognise themselves as global citizens, they are more likely to identify and understand a range of perspectives, develop solutions and take actions that have a genuine impact on self and others.

Teacher practices	Actions
3.1.1 Teachers support students to explore their role as a global citizen	<ul style="list-style-type: none"> <li>• Actively support students to identify and share their own stories, background and cultures</li> <li>• Acknowledge and integrate Indigenous cultural, historical and social perspectives in teaching and learning</li> <li>• Support students to recognise their perspectives on issues</li> <li>• Create opportunities for students to investigate community challenges</li> <li>• Integrate opportunities to develop personal and social capabilities, ethical understanding and intercultural understanding.</li> </ul>
3.1.2 Teachers, students and partners co-design learning that connects to real world contexts	<ul style="list-style-type: none"> <li>• Support students to identify and explore real world issues and problems that matter to them</li> <li>• Plan learning so students can take action by developing innovative solutions that address local and global issues</li> <li>• Seek out opportunities to embed real-world tasks, tools and/or industry standards</li> <li>• Use entrepreneurial thinking and design thinking methodologies to position students as agents of change</li> </ul>
3.1.3 Teachers and students collaborate in learning partnerships in and beyond the school	<ul style="list-style-type: none"> <li>• Meaningfully involve relevant government, business and tertiary partners into units of learning (eg: to provide feedback on student work, offer resourcing or to facilitate excursions)</li> </ul>

### Evidence base:

- Buck Institute for Education. (2018). *Gold Standard PBL: Essential Project Design Elements A research-informed model for improving, calibrating, and assessing your practice*. Retrieved from: <https://www.pblworks.org/what-is-pbl/gold-standard-project-design>
- Hayden, M. (2016). *A review of curriculum in the UK: Internationalising in a changing context*. Curriculum Journal, vol. 24, no. 1, pp. 8-26.
- Lindsay, J. (2016). *The global educator: Leveraging technology for collaborative learning and teaching*. Cheltenham, Australia: Hawker Brownlow Education.
- Lindsay, J., & Davis, V.A. (2012). *Flattening classrooms, engaging minds: Move to global collaboration one step at a time*. Toronto: Pearson.
- Menzie-Ballantyne, K. (2021). A framework for assessing adolescent-focused, active citizenship programs in the context of global competence. *The Social Educator*, 39(1), 14-27. Retrieved from <https://search.informit.org/doi/abs/10.3316/informit.351579867107294>
- Otero, G. (2016). Connecting school, family and community: The power of positive relationships. *Centre for Strategic Education Seminar series*. East Melbourne.

## Practice 3.2 | Include parents, carers, community members and learning partners

### Quote:

"It takes a village to raise a child" (Proverb).

### Theory of practice:

When teachers recognise the role of parents and carers as first educators and engage them in school learning programs, students are more likely to experience an inclusive education within and beyond the classroom.

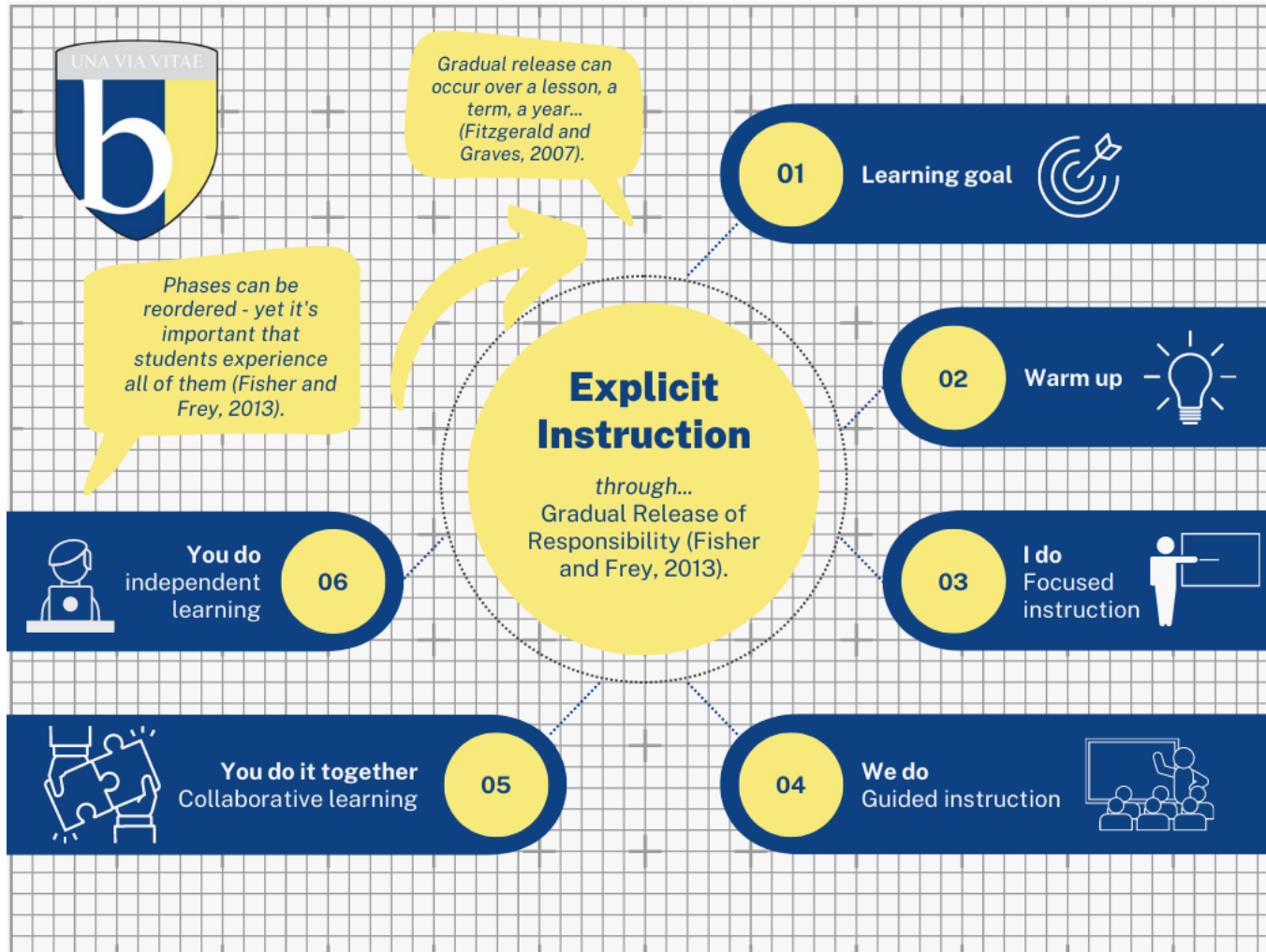
Teacher practices	Actions
3.2.1 Teachers establish open and sustained communications with parents/carers	<ul style="list-style-type: none"><li>• Appreciate the uniqueness of each family and work to overcome potential challenges to establish and strengthen partnerships</li><li>• Provide parents/carers with a range of communication channels to accommodate different needs</li><li>• Provide regular updates on student progress, health and wellbeing, and information about school policies and practice</li><li>• Make regular contact with parents/carers to celebrate successes and identify concerns</li></ul>
3.2.2 Teachers seek and use parents'/carers' knowledge and feedback	<ul style="list-style-type: none"><li>• Value the unique perspectives that parents/carers bring, seeking insights on the strengths, abilities, interests and challenges of each student</li><li>• Consult with parents/carers to develop learning plans to support student learning needs</li><li>• Provide parents/carers with opportunities to present their expectations, understanding and perspectives on their child's education</li><li>• Invite parents/carers to provide feedback on school policies and practices</li></ul>
3.2.3 Teachers facilitate parent/carer involvement in education within the classroom, school and beyond	<ul style="list-style-type: none"><li>• Actively engage parents/carers to establish aspirational student goals and plan learning programs</li><li>• Support parents/carers with information, strategies and resources to link school and home learning</li><li>• Provide opportunities for parents/carers to contribute to school learning programs</li><li>• Facilitate parental/carer participation in whole school improvement, governance and initiatives</li><li>• Use parents, carers and other learning partners as a 'public audience' for the presentation of student work</li></ul>

### Evidence base:

- Buck Institute for Education. (2018). *Gold Standard PBL: Essential Project Design Elements A research-informed model for improving, calibrating, and assessing your practice*. Retrieved from: <https://www.pblworks.org/what-is-pbl/gold-standard-project-design>
- Cox, D. (2005). Evidence-based interventions using home-school collaboration. *School Psychology Quarterly*, vol. 20, no. 4, pp. 473–497.
- DET. (2011). VEYLD Evidence paper: Partnerships with families. Retrieved 24 January 2018 from: <http://www.education.vic.gov.au/childhood/providers/edcare/Pages/profresource.aspx>
- Henderson, A., & Mapp, K. (2002). *A new wave of evidence: The impact of school, family, and community connections on student achievement*. Austin, TX: Southwest Educational Laboratory.

- Jeynes, W. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*, vol. 47 no. 4, pp. 706–742.
- Redding, S., Langdon, J., Meyer, J., & Sheley, P. (2004). The effects of comprehensive parent engagement on student learning outcomes. Presented at the American Educational Research Association convention, San Diego, CA.
- Sheldon, S. B. (2007). Improving student attendance with school, family, and community partnerships. *The Journal of Educational Research*, vol. 100, no. pp. 5, 267–275.

## Pedagogical model (draft/prototype)



## Phases of instruction (draft)

Phase		Teacher	Student
Learning goal	The ' <b>learning goal</b> ' should <u>make it clear</u> what students are to know, understand or do.	<ul style="list-style-type: none"> <li>Create a challenging and achievable learning goal that demonstrates the focus for learning</li> <li>Use the student-centred frame 'I can [cognitive verb] [content or activity]. Eg: <i>I can describe the main causes of World War 1 OR I can create a sketch to show how my design works</i></li> </ul>	<ul style="list-style-type: none"> <li>Engage with the learning goal</li> <li>Show that they comprehend what they need to understand, know or do</li> </ul>
Warm up	The ' <b>warm up</b> ' should <u>elicit prior knowledge</u> in order to prepare students to make connections to new content.	<ul style="list-style-type: none"> <li>Evaluate students' prior knowledge about the intended learning, including vocabulary</li> <li>Use questioning, prompts or an activity</li> </ul>	<ul style="list-style-type: none"> <li>Show that they can make connections to knowledge, skills or processes they have previously learned</li> </ul>
I do – focused instruction	' <b>I do</b> ' is <u>focused instruction</u> , an important part of the overall learning design because it includes establishing a clear lesson purpose to ensure that student's grasp the relevance of the lesson and how to be successful.	<ul style="list-style-type: none"> <li>Establish the purpose for learning</li> <li>Note the relevance of the lesson</li> <li>Think aloud, demonstrate or provide direct instruction</li> <li>Clarify success through a worked example, checklist, rubric, learning progression, proficiency scale, practical demonstration or other means</li> </ul>	<ul style="list-style-type: none"> <li>Show they grasp why the learning is relevant</li> <li>Show they understand how the steps to demonstrate learning evidence</li> <li>Show they understand how to be successful</li> </ul>
We do – guided instruction	' <b>We do</b> ' is <u>guided instruction</u> and is about establishing high expectations and providing support so that students can reach those expectations. The keys to effective guided instruction are planning and differentiation.	<ul style="list-style-type: none"> <li>Interactive instruction</li> <li>Work with students</li> <li>Check, prompt, provide clues</li> <li>Provide additional modelling</li> <li>Differentiate feedback, content, process or product demands to meet needs of students</li> </ul>	<ul style="list-style-type: none"> <li>Ask and respond to questions</li> <li>Work with teacher and classmates</li> <li>Apply feedback</li> <li>Complete processes alongside others</li> </ul>
You do it together – collaborative learning	' <b>You do it together</b> ' is <u>collaborative learning</u> and is a way for students to consolidate their thinking and understanding.	<ul style="list-style-type: none"> <li>Set clear pair/group roles, behaviours and actions</li> <li>Move among groups</li> <li>Clarify confusion</li> <li>Provide support</li> </ul>	<ul style="list-style-type: none"> <li>Work with classmates, share outcomes</li> <li>Collaborate on authentic tasks</li> <li>Consolidate learning</li> <li>Complete processes in small groups</li> <li>Look to peers for clarification</li> </ul>
You do – independent learning	' <b>You do</b> ' is <u>independent learning</u> so students can independently apply information, ideas, content, skills, and strategies in unique situations. Independent learning tasks clearly relate to the instructions each student had received and yet also provide the student an opportunity to apply the resulting knowledge in a new way.	<ul style="list-style-type: none"> <li>Provide feedback</li> <li>Evaluate evidence of learning</li> <li>Determine level of understanding</li> </ul>	<ul style="list-style-type: none"> <li>Work alone</li> <li>Rely on notes, classroom resources and feedback to complete task or activity</li> <li>Take full responsibility for outcomes</li> </ul>

**Source:** Fisher, D., & Frey, N. (2013). *Better learning through structured teaching: A framework for the gradual release of responsibility* (2nd ed.). Alexandria, VA: ASCD.

## Bremer High-impact Teaching Strategies (HITS)

The Bremer HITS are teaching strategies that are proven to be effective for student learning during phases of instruction outlined by our *pedagogical model*. They are designed to be effective in a range of learning areas.

When teachers select and plan to use Bremer HITS, they are implementing high-quality strategies with students they are likely to of experienced in other settings across the school. This enables students allocate their cognitive capacities to the focus of the learning – the knowledge, skill or capability being taught – rather than the process of instruction. It also supports teachers to collaborate and provide feedback on the efficacy of strategies in different contexts.

### Summary of Bremer HITS

#### Learning goals

- Learning goals help explain what students need to understand, know or be able to do. This helps the teacher to plan for learning and students to self-assess their learning progress.

#### Worked examples

- Worked examples reduce cognitive load for students, enabling them to focus on understanding a process which leads to an answer, not the answer itself.

#### 6 Steps to vocabulary

- Marzano laid out a six-step process for building academic vocabulary. It includes direct instruction, linguistic and non-linguistic definitions, recording word learning in a notebook or journal, talking about words, and playing with words.

#### Question-Answer-Relationship

- The question-answer relationship (QAR) comprehension strategy teaches students how to ask key questions about their reading, and then how to find the answers to their questions.

#### Bremer Big 3

- The Bremer Big 3 are school-wide strategies to help students approach numeracy-based and mathematical problems in all learning areas.

#### Manipulatives

- Manipulatives encourage students to explore numeracy and mathematical concepts through visual and physical aides.

## HITS: Learning goals

### What is it?

Learning goals help explain what students need to understand, know or be able to do. This helps the teacher to plan and assess learning and students to evaluate their learning progress.

Demonstrated when the teacher:	Not demonstrated when the teacher:	What students do:
<ul style="list-style-type: none"><li>• uses evidence to differentiate learning goals for groups of students based on need</li><li>• demonstrates a purpose for learning by linking a specific activity to the learning goals</li><li>• provides realistic but challenging goals, and recognises effort towards achieving them.</li></ul>	<ul style="list-style-type: none"><li>• pitches goals at too high or too low level</li><li>• uses unnecessarily high-level vocabulary at an inappropriate reading age</li><li>• praises all work regardless of quality and effort</li><li>• assesses student work against other students' work, rather than against prior achievement and individual learning goals</li></ul>	<ul style="list-style-type: none"><li>• actively engage with the learning goals to plan their own learning</li><li>• self-monitor their progress, and provide evidence they believe demonstrates they have achieved their goals</li><li>• frame future learning goals based on identified strengths and areas for improvement.</li></ul>

### How effective is it?

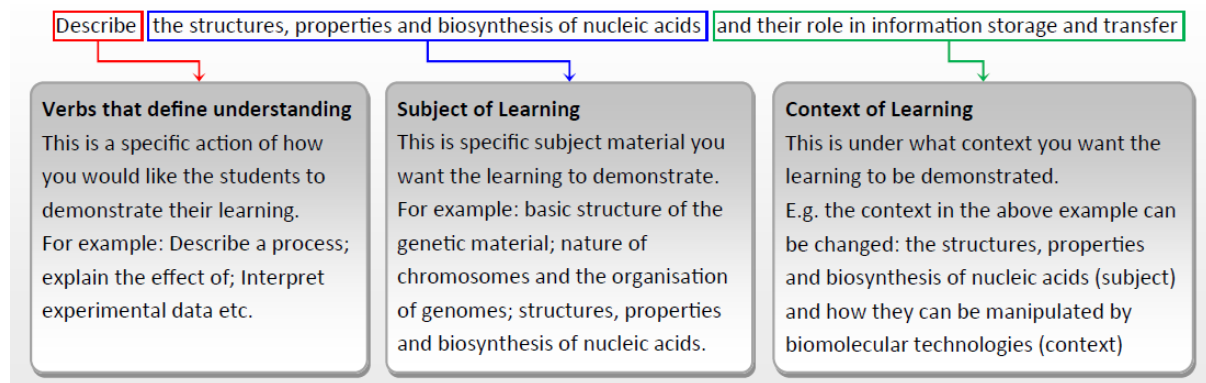
Research shows making learning goals explicit and clear is important for teacher and student clarity - and significantly increases the likelihood that the intended learning is enacted and learned (Hattie, 2009).

### Considerations

- Learning goals must provide challenge for all students. By setting challenging goals, the teacher develops and maintains a culture of high expectations.
- Learning goals should be achievable for students of varying abilities and characteristics. They must also have a firm base in assessed student needs. Assessment provides teachers with evidence of prior learning, and the information they need to set goals that offer each student the appropriate level of stretch/challenge.
- Effective teachers design assessment tasks that require students to demonstrate knowledge and skills at many levels. Tasks will include lower order processes like comprehension, and higher order processes like synthesis and evaluation.
- When teachers explain the connections between learning goals, learning activities and assessment tasks, then students can use learning goals to monitor and progress their learning. This can be supported by the explicit and context-based teaching of cognitive verbs.



## Sample practice



**Source:** Jackson, N., Wisdom & Shaw, M. (2003). *Guide for Busy Academics: Using Learning Outcomes to Design*. Available online at: [http://www.heacademy.ac.uk/resources/detail/resource\\_database/id252\\_guide\\_for\\_busy\\_academics\\_using\\_learning](http://www.heacademy.ac.uk/resources/detail/resource_database/id252_guide_for_busy_academics_using_learning)

## Evidence base:

- Evidence for Learning: Teaching and Learning Toolkit – Australia.  
<http://evidenceforlearning.org.au/the-toolkit/>
- Hattie, J. (2009). *Visible Learning: A synthesis of over 800 meta-analyses relating to achievement*. Milton Park, UK: Routledge.
- Lemov, D. (2015). *Teach like a champion 2.0: 62 techniques that put students on the path to college*. San Francisco, USA: Jossey-Bass.
- Marzano, R. J. (2007). *The art and science of teaching: A comprehensive framework for effective instruction*. Alexandria, USA: ASCD.

## HITS: Worked examples

### What is it?

- Worked examples reduce cognitive load for students, enabling them to focus on understanding a process which leads to an answer, not the answer itself.
- A worked example is a demonstration of the steps required to complete a task or solve a problem and is an excellent way to clarify success for a learning goal.
- By scaffolding the learning, worked examples support skill acquisition and reduce the cognitive load for learners.
- Usually, the teacher presents a worked example to students and explains each step.
- Later, students can use worked examples during independent practice, and to review and embed new knowledge.

Demonstrated when the teacher:	Not demonstrated when the teacher:	What students do:
<ul style="list-style-type: none"><li>• scaffolds the acquisition of new knowledge and skills by presenting students with a clear, step-by-step example</li><li>• designs worked examples that are accessible to students (self-explanatory) and unpacks the learning process, highlighting options available to arrive at the correct solution</li><li>• monitors student learning and supports students to move towards more independent practice.</li></ul>	<ul style="list-style-type: none"><li>• introduces new knowledge and skills with worked examples that are too complex and inaccessible to learners</li><li>• uses the same worked examples for all learners, including those with an already advanced knowledge of the topic or subject matter.</li></ul>	<ul style="list-style-type: none"><li>• are engaged and on task because the worked example is pitched at the right level of challenge</li><li>• understand that the focus is on understanding the process required to complete the task</li><li>• can move with confidence from using worked examples to independent practice.</li></ul>

### How effective is it?

- Worked examples are effective in demonstrating what success looks like, and how to achieve success. This reduces the cognitive load for students by helping them to focus on the process required to complete a task or find the solution to a problem.
- Research demonstrates that worked examples are most effective when the teacher explicitly teaches the steps taken to complete the worked example, and when learners use self explanations to describe the steps to themselves and others.
- The overall impact on student learning is high, measured at 0.57 in Hattie's research.

### Considerations:

- Using a series of worked examples can assist teachers to scaffold student knowledge and skill acquisition. However, when progressively incorporating additional stretch, each new example needs to be adequate to challenge the learner – not too great, not too little.
- Formative assessment is used to monitor student understanding and target teaching to the appropriate level of challenge. Gradually omitting steps from worked examples can be effective too. This approach supports the students' transition from learning by using worked examples as references, to using problem solving and metacognition (for example, self verbalisation and self-questioning).
- The effectiveness of worked examples is related to the learners' relative expertise. Reliance on worked examples decreases as learners' proficiency increases.

### Sample practice

Maths	English	HPE
<ul style="list-style-type: none"><li>• Talk-aloud screen-recording, demonstrating how to solve a problem with stylus annotations</li></ul>	<ul style="list-style-type: none"><li>• Paragraph with language features and text structures highlighted and labelled</li></ul>	<ul style="list-style-type: none"><li>• Step-by-step instructor demonstration of a sport-specific skill</li></ul>

### Evidence base

- Atkinson, R.K., Derry, S.J., Renkl, A. and Wortham, D.W. (2000). 'Learning from examples: Instructional principles from the worked examples research.' Review of Educational Research, 70, 181-214.
- Clark, R.C., Nguyen, F. and Sweller, J. (2006). Efficiency in learning: evidence-based guidelines to manage cognitive load. San Francisco, USA: Pfeiffer.
- Crissman, J. K. (2006). 'The design and utilisation of effective worked examples: A meta-analysis.' ETD collection for University of Nebraska – Lincoln. AAI3208114. <http://digitalcommons.unl.edu/dissertations/AAI3208114>
- Hattie, J. (2009). Visible Learning: A synthesis of over 800 meta-analyses relating to achievement. Milton Park, UK: Routledge.
- Peddie, R., Hattie J. and Vaughan, K. (1999). The use of exemplars in outcome-based curricula: An international review of the literature. Report to the Ministry of Education. Auckland, NZ: Auckland Uniservices Ltd.
- Sweller, J. (2006). 'The worked example effect and human cognition.' Learning and Instruction, 16(2), 165-169.

## HITS: 6 steps to vocabulary

### What is it?

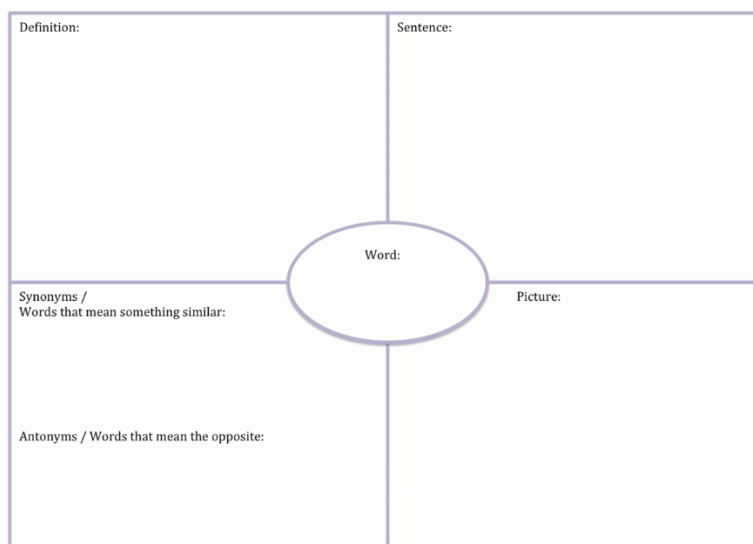
Marzano laid out a six-step process for building academic vocabulary. It includes direct instruction, linguistic and non-linguistic definitions, recording word learning in a notebook or journal, talking about words, and playing with words. Multiple exposures are at the heart of the process.

Steps	Demonstrated when the teacher:	What students do:
<b>Step 1</b> <b>Explain</b>	<p>Provides students with information about the new vocabulary through:</p> <ul style="list-style-type: none"><li>telling a story using the term.</li><li>using a video or online image as a source of information.</li><li>using current community, national or worldly events to connect the term to something familiar.</li><li>describing their own mental pictures of the term.</li><li>finding or creating pictures that exemplifies the term</li></ul>	<ul style="list-style-type: none"><li>actively listen and engage with the information or resource provided by the teacher about the new vocabulary</li></ul>
<b>Step 2</b> <b>Restate</b>	<ul style="list-style-type: none"><li>Ask the students to restate the meaning of the vocabulary in their own words.</li></ul>	<ul style="list-style-type: none"><li>Record their own descriptions of the new vocabulary using their vocabulary notebook</li><li>Record their own explanations of the new vocabulary</li></ul>
<b>Step 3</b> <b>Show</b>	<ul style="list-style-type: none"><li>Ask students to construct a picture, symbol, or graphic representation of the vocabulary. This forces them to think of the term in a totally different way.</li></ul>	<ul style="list-style-type: none"><li>Construct a picture, symbol, or graphic representation of the vocabulary</li></ul>
<b>Step 4</b> <b>Discuss</b>	<ul style="list-style-type: none"><li>Engage students in discussion activities that help them add to their knowledge of the terms in their vocabulary notebooks.</li><li>These activities include having students:</li><li>compare and contrast terms</li><li>classify terms</li></ul>	<ul style="list-style-type: none"><li>Engage in discussion activities using Think-Pair-Share to compare and contrast the vocabulary, classify the vocabulary, identify antonyms and synonyms, and create analogies and metaphors using the vocabulary</li></ul>

	<ul style="list-style-type: none"> <li>• identify antonyms and synonyms, and</li> <li>• create analogies and metaphors using the terms.</li> </ul>	<ul style="list-style-type: none"> <li>• During this time, provide opportunities to add to or revise the entries in their vocabulary notebook</li> </ul>
<b>Step 5</b> <b>Refine and reflect</b>	<ul style="list-style-type: none"> <li>• Ask students to return to their notebooks to discuss and refine entries</li> </ul>	<ul style="list-style-type: none"> <li>• Examine the entries in their vocabulary notebooks to make changes, deletions, and additions.</li> <li>• Do this in pairs or small groups.</li> <li>• Compare their descriptions of the term.</li> <li>• Describe their pictures to each other.</li> <li>• Explain to each other any new information they have learned or new thoughts they have had since the last time they reviewed the terms.</li> <li>• Identify areas of disagreement or confusion and seek clarification.</li> </ul>
<b>Step 6</b> <b>Apply in Learning Games</b>	<p>Involve students in games that allow them to play with vocabulary. Some games might be:</p> <ul style="list-style-type: none"> <li>• Memory - This one is easy. They lay out the "word" and "definition" cards face down and try to match them. This game doesn't really deepen any connections, but is fun and at least helps reinforce the word-definition connection.</li> <li>• Go Fish - This game uses the "word", "definition" and "image" cards. Students start with 5 random cards and play Go Fish with them. The catch (no pun intended) is that they need all three (Word, Definition &amp; Image) cards to count as a match.</li> <li>• Charades - In groups, pairs or as a whole class, students act out a term as their teammates try to guess it.</li> <li>• Pictionary - In groups, pairs or as a whole class, students draw images</li> </ul>	<ul style="list-style-type: none"> <li>• Play learning games with the vocabulary in pairs, small groups or whole class.</li> </ul>

	for terms and their partners try to guess it.	
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### Sample model



### How effective is it?

- Both research and common sense suggest that interacting with other people about what we are learning deepens the understanding of everyone involved—particularly when we are learning new terms.
- Direct instruction in vocabulary is a critical aspect of literacy development.
- Synthesizing research and theory on direct vocabulary instruction into an innovative six-step instructional process enables classroom teachers to teach and reinforce selected vocabulary terms with success
- Much of that research has been described and interpreted in the book Building Background Knowledge for Academic Achievement (Marzano, 2004). In brief, the research and theory point to instructional activities that help students understand new vocabulary terms that are taught directly and also remember what they have learned at a later date. Those instructional activities can be organized into six instructional steps

### Considerations

- Using both linguistic and non-linguistic explanations of a new term will help students develop an initial understanding of the term, as well as help prepare them to create their own pictures or graphic representations in Step 3 of the process.
- It is critical that instead of simply copying what the teacher has said, the students “own” the new terms by constructing their own descriptions, explanations, or examples. Their constructions need not be comprehensive, but efforts should be made to ensure they do not contain major errors.
- Written or oral descriptions require students to process information in linguistic ways.
- If students are not accustomed to creating pictures and graphics for ideas, they might initially need significant guidance and modelling. Even if they have experience with non-linguistic representations, it is likely that they will still need help with terms that are difficult, new to them, or abstract.

- It is important to set aside blocks of time each week to play games in order to energize students and guide them in the review and use of important terms.

**Evidence base**

- Marzano, R.J. (2004). *Building Background Knowledge for Academic Achievement*. Alexandria, VA: Association for Supervision and Curriculum Development

## HITS: QAR – Question-Answer-Relationship

### What is it?

- The question-answer relationship (QAR) comprehension strategy teaches students how to ask key questions about their reading, and then how to find the answers to their questions — whether it means locating a specific fact, drawing an inference, or connecting the reading to their own experience.

Techniques	Demonstrated when the teacher:	What students do:
<b>In the Text: Right There Questions</b>	<p>Uses literal questions whose answers can be found in the text. Often the words used in the question are the same words found in the text. There is usually only one right answer to <i>right there</i> questions.</p> <p>Examples of phrases used for <i>right there</i> questions:</p> <ul style="list-style-type: none"> <li>Who is....?</li> <li>Where is...?</li> <li>What is...?</li> <li>When is...?</li> <li>How many...?</li> <li>When did...?</li> </ul>	<ul style="list-style-type: none"> <li>Provide answers that are usually one-word or short-phrase responses.</li> <li>Build an understanding of key facts or vocabulary from the text</li> </ul>
<b>In the Text: Think and Search Questions</b>	<p>Prepare and ask students to collect information from more than one part of the text and put it together to answer a question.</p> <p>Some examples of phrases used for <i>think and search</i> questions:</p> <ul style="list-style-type: none"> <li>For what reason...?</li> <li>How did...?</li> <li>Why was...?</li> <li>What caused...?</li> </ul>	<ul style="list-style-type: none"> <li>Provide answers that are usually short answers and found in several parts of the text.</li> <li>Demonstrate inference</li> </ul>
<b>In My Head: Author and Me</b>	<p>Prepare and ask questions based on information found in the text, but ask the reader to relate the question to their own experience.</p> <p>Although the answer does not lie directly in the text, the student must have read it in order to answer the question.</p>	<ul style="list-style-type: none"> <li>Use their prior knowledge to answer these types of questions.</li> </ul>



	<p>Some examples of phrases used for Author and Me questions:</p> <ul style="list-style-type: none"> <li>• Would you...?</li> <li>• Which character...?</li> <li>• Did you agree with...?</li> <li>• What did you think of...?</li> </ul>	
<b>In My Head: On My Own</b>	<p>Ask questions that do not require the students to have read the passage. Readers rely on their background or prior knowledge to answer the question.</p> <p>Some examples of phrases used for On My Own questions:</p> <ul style="list-style-type: none"> <li>• Do you know...?</li> <li>• Have you ever...?</li> <li>• Would you ever...?</li> </ul>	<ul style="list-style-type: none"> <li>• Use their prior knowledge to make some type of judgment about or relate to the topic of the text.</li> <li>• Use knowledge from the text and apply it into a different context.</li> </ul>

#### How effective is it?

- It can improve students' reading comprehension.
- It teaches students a way to independently ask questions about their reading, a cognitive strategy skilled readers use.
- It helps them find the answers to their questions, whether it means locating a specific fact, drawing an inference, or connecting the reading to their own experience.
- It inspires students to think creatively and work cooperatively while challenging them to use higher-level thinking skills

#### Considerations:

- Apply the QAR strategy to content area material. Have students gather specific questions from various content areas, find the answers, determine the categories of questions, and create a QAR visual. Ask students to analyze and look for trends in the examples they found. Ask, "Are there any subjects that use only one or two types of question-answer relationships?"
- Have students develop a method to teach the QAR strategy to another class.
- Give different reading passages to several small cooperative groups. Have each group write four types of questions, based on the QAR strategy, on index cards. On the backs of the cards, have students answer the questions, categorize the question-answer relationships, and briefly explain their processes. Make this a part of your "what you can do when you are done"

work. Groups can then exchange cards, find the answers to the questions, and check the backs of the cards to see if they agree with the group that wrote them.

- Based on a given reading passage, provide students with answers and ask them to write questions and categorize the question-answer relationships.

### **Evidence base**

- Fordham, N. W. (2006). Crafting questions that address comprehension strategies in content reading. *Journal of Adolescent & Adult Literacy*, 49, 390-396.
- Liang, L. A., Watkins, N. M., Graves, M. F., & Hosp, J. (2010). Postreading questioning and middle school students' understanding of literature. *Reading Psychology*, 31, 347-364.
- Raphael, T.E., & Au, K.H. (2005). QAR: Enhancing comprehension and test taking across grades and content areas. *The Reading Teacher*, 59, 206-221.
- Wilson, N. S., & Smetana, L. (2011). Questioning as thinking: A metacognitive framework to improve comprehension of expository text. *Literacy*, 45, 84-90.

## HITS: Bremer BIG 3

### What is it?

- The Bremer Big 3 are school-wide strategies to help students approach numeracy-based and mathematical problems in all learning areas. The three strategies are:
  - Visualise
  - Estimate
  - Close read
- The three approaches are discrete strategies, yet may be used consecutively by students to support the solving of problems.

Demonstrated when the teacher:	Not demonstrated when the teacher:	What students do:
<ul style="list-style-type: none"> <li>• Models and teaches the Bremer Big 3 through worked examples – visualise, estimate, close read</li> <li>• Reminds students to use the Bremer Big 3 during individual work, group work and assessments</li> <li>• Displays Bremer Big 3 poster on classroom</li> <li>• Embeds the Bremer Big 3 banner in learning materials</li> </ul>	<ul style="list-style-type: none"> <li>• Encourages use of only formula to solve problems</li> <li>• Encourages few ways to approach or solve a problem</li> <li>• Does not give students the opportunity to physically highlight or cross out portions of the question</li> </ul>	<p>Visualise</p> <ul style="list-style-type: none"> <li>• Pictures the problem in their mind</li> <li>• Draws rough diagrams, scale drawings, sketches or cartoons</li> <li>• Use manipulatives</li> </ul> <p>Estimate</p> <ul style="list-style-type: none"> <li>• Question whether a response makes sense or seems reasonable</li> <li>• Propose 'ball-park' figures or rough estimates to problems</li> <li>• Eliminate wrong answers</li> <li>• Eliminate formulas or processes that won't work</li> <li>• Guess and check</li> </ul> <p>Close read</p> <ul style="list-style-type: none"> <li>• Highlight and summarise important information or data provided</li> <li>• Eliminate unnecessary information</li> </ul>

		<ul style="list-style-type: none"> <li>• Re-read information</li> </ul>
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### How effective is it?

- Visualising numbers, proportion and order is an innate human trait (Siemann & Petermann, 2018). Practicing visualisations of number, in partnership with verbal representations develops understanding and achievement (Malone et al., 2020). increasingly complex calculations rely on the coordination of both visuo-spatial and verbal representations of the digits (Dehaene & Cohen, 1995).
- Social practice indicates that numeracy is a very personal capacity and reflects the needs of the user and therefore the learning area.
- “Numeracy will have different meanings for different students, depending on their numeracy experiences at school, at home and in other contexts in which they interact” (Sellars, 2018, p. 24).
- Learning how to estimate is important, not only because estimating is something we need to do all the time, but also because proficiency at estimation is substantially correlated with many aspects of numerical understanding and with overall math-achievement-test scores (Booth & Siegler, 2006; Siegler & Booth, 2005).
- Being explicit and strategic about how you read – and re-read – maths problems is likely to help many pupils who are grappling simultaneously with learning the mathematics and the language of mathematics.

### Considerations:

- Consistent, repeated use of the Bremer Big 3 in all learning areas will decrease the ambiguity surrounding strategies to approach numeracy-based and mathematical problems

- The Bremer Big 3 strategies should be introduced at the beginning of each Semester and then reinforced constantly by referencing the Bremer Big 3 banner on relevant learning resources, and posters on every classroom wall.
- All teachers should also use the Bremer Big 3 in subject related numeracy learning experiences to ensure a consistent approach across the curriculum.
- Estimation is an important skill to be numerate in the real world.

### **Evidence base**

- Dehaene, S., & Cohen, L. (1995). Towards an anatomical and functional model of number processing. *Mathematical Cognition*, 1(1), 83–120.
- Malone, S. A., Burgoyne, K., & Hulme, C. (2020). Number knowledge and the approximate number system are two critical foundations for early arithmetic development. *Journal of Educational Psychology*, 112(6), 1167–1182. <https://doi.org/10.1037/edu0000426>
- Sellars, M. (2018). Numeracy in Authentic Contexts. In *Numeracy in Authentic Contexts*. <https://doi.org/10.1007/978-981-10-5736-6>
- Siemann, J., & Petermann, F. (2018). *Innate or Acquired ? – Disentangling Number Sense and Early Number Competencies*. 9(April), 1–13. <https://doi.org/10.3389/fpsyg.2018.00571>
- Siegler, R., & Ramani, G. (2006) Early Development of Estimation Skills  
<<https://www.psychologicalscience.org/observer/early-development-of-estimation-skills>>
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<<https://www.theconfidentteacher.com/2021/04/does-reading-really-matter-in-mathematics/>>

## HITS: Manipulatives

### What is it?

- Manipulatives encourage students to explore numeracy and mathematical concepts.
- Examples of manipulatives are blocks, Unifix blocks, counters, number lines, fraction strips, base ten counters, geoboards, play money, clocks, geometrics 2D and 3D shapes, nets and folded paper.
- Manipulatives can be physical or visual
- Physical manipulatives allow students to visualise, touch and move objects to express their thinking.

Demonstrated when the teacher:	Not demonstrated when the teacher:	What students do:
<ul style="list-style-type: none"> <li>• Demonstrates mathematical concepts by using concrete materials</li> <li>• Provides students with opportunities to explore mathematical concepts by using manipulatives</li> <li>• Provides opportunities for using virtual manipulatives</li> <li>• Encourages student to link the materials with the maths in the learning experience</li> <li>• Uses manipulatives with students of all ages</li> <li>• Encourage students to verbalise their mathematical thinking</li> <li>• Use manipulatives to relate mathematical concepts with the real world</li> <li>• Encourage students to take ownership of their learning</li> </ul>	<ul style="list-style-type: none"> <li>• Encourages use of only formula to solve problems</li> <li>• Encourages students to learn a series of rules</li> <li>• Fails to have sufficient concrete materials for all students to participate in the learning experience</li> <li>• Considers manipulatives are only useful for young children</li> <li>• Only allow one method to solve a problem</li> <li>• Don't allow students time to explore mathematics</li> </ul>	<ul style="list-style-type: none"> <li>• Explore mathematical concepts with concrete materials</li> <li>• Visualise, touch and move manipulatives to express their thinking</li> <li>• See the relationships in maths rather than just trying to get the right answer</li> <li>• Draw diagrams to explain relationships with the manipulatives</li> <li>• Sort</li> <li>• Order</li> <li>• Distinguish patterns</li> <li>• Recognise shapes and relationships between them</li> <li>• Represent mathematical concepts in a variety of ways</li> <li>• Connect different mathematical concepts</li> <li>• Make measurements</li> </ul>

### How effective is it?

- Manipulatives can be an important tool to help students think and reason in a more meaningful way. Stein and Bovalino (2001) concluded that by providing manipulatives, teachers create a more meaningful experience for students by offering a concrete form for which students can then see the relevance.
- Florence (2012) argues that mathematics manipulatives can help engage students for a longer period of time by helping them stay focused on particular tasks. She believes that lecture based teaching can often seem boring but that manipulatives allow students to be actively involved in learning.
- A study by Swirling (2006) showed that the use of concrete or virtual manipulatives could improve students' learning when dealing with complicated concepts. It was found that when manipulatives were used effectively, student understanding and engagement increased.
- Moyer (cited by Bouk & Flanagan, 2010, p. 187) believes the benefits of virtual manipulatives include facilitating the introduction or revision of Mathematics ideas, aiding the understanding of visual concepts through the use of visuals, scaffolding learning, and engaging students in learning.

#### **Considerations:**

- Manipulatives encourage inquiry-based or problem-based approaches to developing understanding of concepts and processes.
- Manipulatives can be used in any learning area numeracy or mathematical skills are being developed.
- A wide variety of manipulatives are included in Numeracy Lessons and are available for teachers to book through SOBS.

#### **Evidence base**

- Cockett, A., & Kilgour, P. W. (2015). Mathematical manipulatives: Creating an environment for understanding, efficiency, engagement, and enjoyment. TEACH COLLECTION of Christian Education, 1(1), 47-54. Retrieved from <https://research.avondale.edu.au/teachcollection/vol1/iss1/5Quigley>, A (2021) Does Reading Really Matter in Mathematics < <https://www.theconfidentteacher.com/2021/04/does-reading-really-matter-in-mathematics/>>
- Daghestani, L. (2013) The Design, Implementation and Evaluation of a Desktop Virtual Reality for Teaching Numeracy Concepts via Virtual Manipulatives. Doctoral thesis, University of Huddersfield. <http://eprints.hud.ac.uk/id/eprint/19037/>
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