Australian
Education
Research
Organisation

Evidence snapshot

Multi-tiered system of supports: Tier 2 and 3 interventions

Providing evidence-based literacy and numeracy support in secondary school

This guide aims to help secondary school leaders and teachers assist students in Years 7 to 9 who have significant gaps in foundational literacy and numeracy skills. It is primarily aimed at those able to make whole-school decisions. It is a part of a series that will provide guidance on how Australian schools can best support struggling students. The focus of this document is to share the instructional strategies most likely to have a positive impact based on the available evidence. These strategies are intended to be utilised within a multi-tiered system of supports (MTSS) framework.

Related frameworks

Australian Professional Standards for Teachers

Focus Area 2.5, 5.4

Australian Professional Standards for Principals

Professional Practice 1

For background on MTSS frameworks, go to AERO's Introduction to multi-tiered system of supports. Some of the examples provided in this document may not apply in all school contexts, and professional judgments should be made, where necessary, to ensure the best possible support for students.

This guide draws on a review of evidence-based approaches for supporting these students conducted by Monash University, supplemented by cited guidance.

Small-group and one-to-one instruction

Tier 2 and 3 interventions involve students being grouped by a shared need for common, intensively delivered instruction. Making time within the school day for targeted, small-group (or 1:1) intervention provides students with designated space for focused skill acquisition or the development of fluency in skill execution.

Try to minimise disruption to students' scheduled learning and timetabled classes. For example, aim to run additional, supplementary classes at times convenient to your school context. Small-group instruction should be additional to, and aligned with, work in general education classrooms and should not replace it. Note that mixed ability grouping is encouraged at Tier 1. Mixed ability grouping during Tier 1 instruction makes it possible for students to interact with more capable peers and see skills modelled. Small group intervention lessons also should not be a repeat of Tier 1 classroom material. They should focus on the development of key foundational skills that students have failed to grasp during earlier years of schooling.

As students' need for intervention increases, group size can be reduced to enable greater individualisation and intensification of support. In some cases, students requiring Tier 3 interventions may need one-to-one instruction.

Consider your context before deciding the number of students within your intervention group, including:

- logistical constraints (including timetable constraints, staffing and budget)
- the nature of the intervention
- instructional factors, such as the level of individualisation needed
- contextual factors, such as student social dynamics, motivation and engagement, and parental consent.

Staff delivering small-group instruction may be teachers, education support staff or other qualified staff members. Where an education support staff member is running an intervention, this must always be overseen by a teacher or similarly qualified member of staff, who should take responsibility for progress monitoring and intervention adjustment. All staff members involved in intervention must:

- Be trained in domain-specific intervention and supported by the school to deliver the intervention program.[1]
- Understand how to use data to inform instruction. This includes the capacity to frequently monitor progress using curriculum-based assessments.
- Use progress data to adjust interventions as required.

Effective instructional practices

The following instructional practices have a measurable positive effect for secondary students who struggle with reading, writing and mathematics. These strategies should be understood and implemented by teachers at Tier 1, then intensified in Tiers 2 and 3. Mixed-ability grouping during Tier 1 instruction makes it possible for students to interact with more capable peers and see skills modelled.

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1 To explore further, see Evidence for Learning's toolkit on One-to-One Tuition and report "Making Best Use of Teaching Assistants".

Explicit instruction

Explicit instruction means breaking down what students need to learn into smaller learning outcomes and modelling each concept so students can see what is expected of them. It involves fully explaining and effectively demonstrating what students need to learn, including:

- chunking content into smaller steps
- modelling concepts
- using worked examples
- providing opportunities for students to undertake guided and independent practice for what they have learned.

Research shows that explicit instruction is effective in teaching all literacy and numeracy skills, including writing, maths word problem-solving and fractions. Many specific instructional strategies are more effective when embedded within a broader explicit instruction framework. For guidance on how to implement explicit instruction, see AERO's practice guide.

Self-regulated strategy development

Self-regulated strategy development (SRSD) aims to support students in becoming self-regulated and strategic learners. It teaches students strategies to become effective learners, such as planning, evaluating and revising work. SRSD uses guided and independent practice of strategies, supporting students to move from teacher-directed to self-directed.

SRSD involves students learning about:

- cognitive strategy skills – consciously implementing thought processes, such as organising key information from a text or word problem
- metacognitive strategy skills – understanding how we learn and cognitively process information
- management strategy skills – how to set goals, identify processes and track progress
- motivational aspects – how to maintain our own motivation and engagement.

An example of SRSD in relation to reading is supporting students to use the 'read, ask and paraphrase' framework, below:

- read a paragraph or passage
- ask yourself, 'What is the topic? What is the most important thing it tells me about the topic?'
- paraphrase this information (put it into your own words).

SRSD is an effective approach, even for students with specific learning difficulties such as dyslexia. *Self-Regulated Strategy Development Online* have a useful resource containing guidance on how to implement SRSD.

Effective instructional strategies: domain-specific

The following instructional strategies, grouped by domain, have been shown to produce a measurable positive effect for secondary students in developing foundational reading, writing and mathematics skills. These strategies should be deployed to address specific skills or domain components students find challenging (and where the strategy is shown to be effective). These strategies should be used intensively at Tiers 2 and 3, but Tier 1 teachers should have familiarity with them to ensure instructional alignment between all three tiers.

Reading

A theoretical explanation of how reading skills are acquired is provided by the Simple View of Reading (SVR) model. The SVR proposes that reading comprehension, the capacity to extract meaning from print, consists of 2 components: word recognition (decoding and the capacity to recognise printed words) and language comprehension (the ability to derive meaning from spoken words). The relationship between the 2 components is conceptualised in the SVR as:

decoding x language comprehension = reading comprehension

Fluency, the ability to read accurately, quickly, and expressively, also creates problems for some secondary students. Fluency is a separate but related construct to the simple view of reading. Fluent readers can focus on reading for meaning; thus, fluency is an essential prerequisite to secondary school success.

By secondary school, most readers have been exposed to the alphabetic code, but issues with language comprehension commonly create barriers to being able to read at level. Problems with reading fluency are also common. Problem-solving teams should examine student screening data, and additional diagnostic data if appropriate, to consider whether the student is having problems with word recognition or language comprehension and intervene accordingly.

Word recognition

Struggling readers at secondary level may require intensive interventions that include direct and explicit instruction in word- and text-level skills, as well as engaged reading practice with effective and corrective feedback. Systematic, synthetic phonics instruction, which teaches letter-sound relationships and spelling in a planned and sequenced manner, will be the first step for older struggling readers who show difficulty in decoding letters and sounds. Phonics instruction supports students to learn segmenting, blending and phoneme manipulation. It supports students to learn accurate word recognition, to decode words correctly and to support general reading ability.

Phonics instruction may be supported by instruction in morphology and syllabification. Morphological instruction focuses on words and how they are formed. The smallest unit of meaning within a word is called a *morpheme*, and morphological instruction teaches students

to break down words into these units to pronounce and understand them more effectively. Syllabification teaches the rules of syllable division and combination so students can decode words more fluently and accurately.

Language comprehension

In the secondary context, language comprehension problems can be addressed by building students' vocabulary as well as background information.

Mnemonic instruction, used alongside morphological instruction and explicit instruction, has been found to positively impact vocabulary. Mnemonic instruction links new information to prior knowledge using visual and/or acoustic cues to support memory of new information. Examples of mnemonic strategies are provided below.

- Pegwords: rhyming words with numbers to remember an order. Pegwords associated with numbers are memorised as a starting point (for example, one is gun, two is shoe). Then, when items need to be remembered in order, mnemonics are developed to associate the concepts with the pegword.
- Keywords: associating a word or its meaning with a visual keyword.
- Acronyms and acrostics: combining the first letter of each word in a sentence or group to form a memory word.

Graphic organisers, which are visual and spatial displays that include lines, arrows, text and shapes to organise content and ideas, can also be used to support language comprehension. They can be used to represent, organise and describe content, structure and conceptual relationships within a text. Examples of graphic organisers include Venn diagrams, story maps and cognitive maps.

Fluency

The simple view of reading suggests that word recognition supports reading fluency. Repeated reading (RR) can also aid reading fluency, by asking students to read short word passages aloud to a teacher (or other qualified staff member) several times until the student reaches a satisfactory fluency level. Passages should generally be between 50 to 200 words. The effects of RR can be enhanced when embedded into an instructional framework, which could include explicit reading instruction, modelling best practice (such as a teacher or peer reading aloud) and providing corrective feedback. All fluency practice must include effective and corrective feedback from a teacher.

Writing

Proficient writing involves the subskills of punctuation, grammar, creating texts, spelling and structuring sentences. Writing intervention must reflect an understanding that student writing evolves as a progression of skill development. If students are having problems with writing, intervention must start at the sentence level before moving to an expectation that students can produce paragraph writing and extended writing.

Simplest ➤ **More difficult**

Sentence level writing	Paragraph writing	Extended writing
Teaching writing starts at the sentence level. Sentence level writing includes sentence structure, punctuation, cohesion, vocabulary, and spelling.	Once students have mastered sentence-level writing, intervention can focus on paragraph writing. Paragraph writing is the segmenting of text into paragraphs that assists the reader to follow the line of argument.	Once students can write at the sentence and paragraph level, instruction and intervention can focus on extended writing. In extended writing, students show control of language through developing audience, text structure, ideas, cohesion and using persuasive devices.
Teaching sentence level writing includes:	Strategy instruction can be useful in teaching students to write paragraphs. Strategy instruction provides students with:	Teaching extended writing can be aided with graphic organisers such as story maps and mind maps. These are visual ways of organising written ideas. Graphic organisers can improve student writing quality, genre elements and text productivity, as well as enabling the use of more complex syntax and vocabulary.
• Teaching the building blocks of sentences: syntax (nouns, verbs, adverbs etc) and function (subject, verb, object). • Teaching sentence combining using conjunctions and varying language. • Teaching types of sentences – simple, complex, compound and subject. • Developing subject-specific vocabulary and student understanding of how best to structure sentences depending on which subject area they are writing for.	• a rationale for the strategy ('why' we write paragraphs) • a description of where and when to use the strategy • multiple models of strategy application, taught explicitly • modelling to guide students in their application of the strategy; then • releasing them for independent practice once they can apply the strategy effectively.	
Students lacking these skills should be taught them using the key components of explicit instruction, such as modelling, prompting, opportunities to practice and provision of corrective and timely feedback. This can be accompanied by timed tasks for practice, and graphic organisers to support the generation of text.	Students should be explicitly taught how to write a range of paragraph types. Most commonly this is done by providing an overall structure for students, such as an opening sentence, detail sentences that link to the opening sentence, and either a concluding sentence to close or a transition sentence to the next paragraph. Teachers should also model how the structural and linguistic features of paragraphs differ based on writing purpose.	Both computer-based graphic organiser interventions and paper-and-pen graphic organisers are impactful in writing intervention. Teacher-generated and student-generated graphic organisers have similar impact.
When students have acquired the above skills, intervention can move to the expectation that the student can build a paragraph.		It is important to note that the use of graphic organisers in the writing process should be used as a supplementary tool alongside other high-impact instructional strategies such as explicit instruction, guided practice and regular feedback.

Mathematics

Proficiency in mathematics allows students to use mathematical knowledge, skills, procedures, and processes to make informed decisions and respond to problems efficiently. It involves a broad range of thinking, reasoning, and problem-solving skills. These include:

- number knowledge
- spatial reasoning
- pattern recognition
- skills in measurement
- estimation
- working with data.

Strategies, skills and knowledge in the above areas are not used in isolation; effective mathematical problem-solvers understand the relationships between different areas of mathematical content.

The instructional strategies below have been shown to have a positive impact for struggling students in developing key foundational knowledge and skills. Compared to the instructional strategies recommended for reading, these strategies are more general in nature, which may be reflective of the smaller body of evidence available for mathematics in secondary school. These strategies should be embedded within a broader instructional framework, such as explicit instruction.

Use of visual models

Visual models in mathematics are materials consisting of concrete materials, pictures or images used as a support to understand -mathematical concepts. For example, manipulatives, such as base-10 blocks, can be used to help students understand relative numerical values and the place value system.

When used as part of a multicomponent intervention involving explicit teaching and student practice, the effective use of visual models (and physical representations) has a high impact on students' capacity to solve word problems, fractions and algebra. It is suggested that the approach helps students' capacity to identify underlying structures and relationships among key components in word problems.

Schema-based instruction

Schema-based instruction (SBI) is an explicit instruction strategy that supports students to identify the underlying structure (schema) of a word problem, so it can be applied to similar future problems.

This strategy involves utilising the following steps iteratively to refine students' approaches to any given problem:

- identifying the key information in a word problem
- establishing the problem type
- determining steps towards a solution
- solving the problem.

Early attempts at SBI for a specific problem may make use of visual models (such as flowcharts or visual representations of equations) to support the pathway to the solution.

There is evidence that SBI aids students in solving word problems, particularly for those underachieving in mathematics.

Concrete-Representational-Abstract

Concrete-Representational-Abstract (CRA) is an instructional approach that involves 3 steps.

1. Concrete: teach a concept using manipulatives (such as base-10 blocks, counters and tangible shapes).
2. Representational: introduce the concept using pictures that represent objects (that is, show drawn representations of base-10 blocks for place value, or other proportional representations).
3. Abstract: introduce the concept using only numbers and symbols.

Many concepts are more quickly understood by teaching at a concrete level first, then representational and then abstract, with opportunities for modelling, guided practice and independent practice at each stage. Provide opportunities to practice at each level. Teachers must be confident that a student grasps the concept at that level before moving to the next one.

CRA is effective in building basic number facts, teaching concepts such as algebra, and overall mathematics and arithmetic skills.

Interventions that incorporated CRA alongside a robust instructional framework – including modelling, guided and independent practice, monitoring progress and providing feedback – improve students' computational skills with decimals, fractions, geometry, teaching integers, solving linear equations, and problem-solving tasks.

Note that the use of CRA is a scaffolding system, so manipulatives should be removed once students can operate independently from them.[2]

For more information

For more information on how to implement MTSS within your school setting, see our work on the AERO website.

To provide feedback on this guide or view further information, including full references and additional resources, visit AERO's website.

General

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2 For further guidance, see the Education Endowment Foundation's 'Improving Mathematics in Key Stages 2 and 3'.

For more information visit
edresearch.edu.au

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