4 Load reduction instruction policy

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How to use this policy

Load reduction instruction (LRI) is an approach to instruction that seeks to reduce the cognitive burden on learners by optimally balancing explicit instruction with guided independent learning. LRI refers to a set of pedagogical principles that can be used to improve student learning, motivation, and engagement. This policy on LRI applies to classroom teachers for implementation in the everyday course of pedagogy. This policy can also be applied by educators in learning support roles. At the school level, it is recommended that school leaders support teachers to integrate LRI in day-to-day classroom instruction, as well as one-on-one instruction as appropriate. It is also recommended that teachers and relevant support staff receive professional development to ensure LRI is implemented in line with the evidence base. This policy is intentionally broad and school policymakers are encouraged to delete and build upon suggestions below to create a policy that best serves the learning needs of students in their school.

[INSERT name of school] Load reduction instruction policy

Rationale

Research has shown that explicit instruction is significantly associated with students' achievement gains (Evans & Martin, 2020). This is because it presents learning material in a way that reduces the cognitive burden on students as they learn (Sweller, 2012; Sweller et al., 2011). Then, as students develop sufficient knowledge and skill, they can be provided with more independence as learners—such as through guided independent activities or guided discovery learning (Liem & Martin, 2013). Introducing independent learning too early in the instructional process, and without sufficient guidance, can overload learners' working memory (Mayer & Moreno, 2010); however, if learners do not move to guided independent learning after they have become fluent in the required knowledge and skill, they can become bored and disengaged (Kalyuga et al., 2003; Kalyuga et al., 2001). Thus, explicit instruction and independent (or discovery) learning do not represent a false dichotomy; rather, the success of one depends on the success of

the other. Load reduction instruction (LRI) (Martin, 2016; see also Martin & Evans, 2018; 2019) has been recommended as an instructional approach that emphasizes explicit instruction in the initial stages of learning, and then a progression to guided independence as the automaticity and fluency in knowledge and skill develop. The overall approach, therefore, resembles a careful mix of teaching strategies, ranging from *I-do* strategies like demonstration, modelling, and explaining, *we-do* strategies like scaffolded practice and experimentation, and *you-do* strategies such as guided real-world projects.

Purpose

The purpose of this policy is to provide guidelines for implementing LRI as a means of easing the cognitive burden of student learning.

Scope

This policy applies to teachers, relevant learning support staff, and school leaders. Teaching and relevant learning support staff will apply LRI in the classroom, in small groups of students, or one-on-one as appropriate. School leaders will support and further inform teachers' implementation of LRI.

Policy statement

Teachers and learning support staff ("educators")

Educators recognize that academic life becomes increasingly demanding as students move from one grade (year level) to the next (Martin, 2015). Each year at school, the difficulty of subject matter and the frequency and amount of assessment escalates. Educators need to understand that this imposes significant cognitive demands on students (Kirschner, et al., 2006).

Educators at **[INSERT name of school]** seek to ease the cognitive burden on students in the early stages of their learning and then administer more challenging schoolwork as they develop the relevant knowledge and skill (Liem & Martin, 2013).

Educators do so by attaining the optimal balance between explicit instruction and guided independent learning (Martin & Evans, 2018).

LRI (Martin, 2016; see also Martin & Evans, 2018; 2019; Martin et al., 2020) is an instructional approach aimed at attaining this balance. It initially involves explicit instruction. Then, as students' knowledge and skill build, it involves less structured approaches such as guided independent learning (e.g., see evidence on the expertise reversal effects; Kalyuga et al., 2001; 2003).

To implement LRI, educators at **[INSERT name of school]** observe the following principles at key points in the learning process: Principle #1: Reduction of task difficulty during initial learning, as appropriate to learners' prior knowledge; Principle #2: Instructional support and scaffolding through the task; Principle #3:

Ample structured practice; Principle #4: Appropriate provision of instructional feedback-feedforward; and Principle #5: Guided independent application and learning (Martin, 2016; see also Martin & Evans, 2018; 2019; Martin et al., 2020).

- Principle #1: Educators reduce the difficulty of a task during initial learning (i.e., new concepts or at the beginning of a new topic) as appropriate to learners' prior knowledge by: revising key ideas as needed; clearly modelling/demonstrating how to do something; breaking work into "bite-size" manageable chunks; and, doing regular checks of students' learning in the early stages of a topic, task, or activity.
- Principle #2: Educators provide instructional support and scaffolding by: ensuring that students' attention is focused on the central information and material (not on irrelevant material); having logical sequencing of how information is presented to students; organizing information under themes or big ideas; giving students sufficient time to master a task; providing worked examples so students know what a completed task looks like; providing templates to scaffold students through a task; and, adjusting tasks to individualize for the student where appropriate.
- Principle #3: Educators provide ample structured practice through deliberate practice (students rehearse material or a skill until learned); mental practice (students rehearse something in their mind); and guided practice (students are prompted through a structured task). Structured practice could be focused on new knowledge or revisiting material covered previously so as to maintain fluency.
- Principle #4: Educators provide instructional feedback-feedforward by sharing examples of good/completed work if students have difficulty with a task; providing feedback, which is specific information about the correctness of an answer or response; and providing feedforward that comprises feedback and specific suggestions for future improvement. Educators also use feedback regularly during lessons as information for them to continue or alter the course of the lesson according to whether students are understanding the material.
- Principle #5: Educators provide opportunities for independent practice and guided discovery learning through: guided independent practice where the learner attempts similar problem tasks to tasks already rehearsed (after relevant skills and knowledge have been developed); and guided discovery learning where the learner attempts ill-defined or novel problem tasks (typically conducted after guided independent practice). Importantly, even in the context of independent learning activities, learners may still need explicit instruction in metacognition and self-regulated learning (e.g., planning their learning, managing projects, and monitoring progress towards goals), and working in groups (Evans & Martin, 2020).

In balancing student- and teacher-centred approaches, educators at **[INSERT name of school]** progress students through three stages that closely align with the sequence of LRI Principles #1–5 (Martin, 2016), often referred to as an *I-do, we-do, you-do* approach (e.g., Archer & Hughes, 2011; see DeRuvo, 2009 for a summary in relation to at-risk students):

- First, educators implement the student-centred instruction phase (I-do). Here, educators organize and present instructional material with full regard for students' prior learning and ability.
- Second, after the initial student-centred instruction, educators initiate the student-centred exchange phase (we-do). Here, the educator provides students with guided practice, questioning, and worked examples, and checks for students' understanding through these activities.
- Third, when the educator is satisfied the student has the key knowledge and skill, they initiate the student-centred learning phase (you-do). Here the educator assigns an appropriate problem task where the student can take more responsibility for independent practice, checks, and reviews their own work, and engages in further discovery or exploration.
- Thus, educators understand that at different stages of LRI, student and teacher roles shift from (a) teacher instructional salience to (b) distributed teacher and student interaction to (c) student learning salience.

Educators at **[INSERT name of school]** apply LRI to students of all ability levels (Martin, 2015). Even high ability students are novices in the early stages of a new topic or problem task and thus require educators to implement Principles #1–4. However, high ability students will typically move from novice to expert status with relatively less practice and rehearsal than other students (Martin, 2016). They are thus usually able to move to guided independent learning (Principle #5) more quickly than other students.

School leaders

School leaders at **[INSERT name of school]** ensure that educators know the five LRI Principles.

School leaders at **[INSERT name of school]** ensure that educators have sufficient knowledge of students' prior knowledge to enable appropriate delivery of LRI Principles #1–5.

Sufficient time at **[INSERT name of school]** is allocated to educators to share with each other examples of successful LRI practices.

Efforts are made at **[INSERT name of school]** to ensure students' learning is monitored to facilitate targeted and appropriate delivery of LRI.

[INSERT name of school] has a comprehensive approach to identifying learning gaps and identifying how LRI principles can be applied to address them.

[INSERT name of school] endeavours to employ capable educators who understand the cognitive dimensions of student learning, and instructional approaches that manage the cognitive burden on students as they learn.

[INSERT name of school] endeavours to employ capable educators who have a strong repertoire of explicit instructional practices and also evidence of high quality guided independent, discovery, and inquiry-based learning approaches.

[INSERT name of school] ensures that educators have access to professional learning that can build successful practices in LRI.

[INSERT name of school] has strategies in place to evaluate, build, or strengthen an educator's explicit and guided independent instructional

strategies (e.g., peer observation, peer mentoring, ongoing professional development, induction programs for new staff, etc.).

Rating of evidence base

Figure 4.1 Load Reduction Instruction Rating of Evidence.

Author Note: NATURE AND QUALITY OF EVIDENCE BASE: The body of evidence spans experimental research by cognitive load theory researchers, major meta-analyses by other cognitive/instructional psychology researchers, and large-scale school reform research. More recently, LRI practices are supported by large-scale correlational research. The explicit instructional strategies tend to have accumulated the largest body of empirical support, with guided independent application supported by research demonstrating “expertise reversal” effects and similar. **EVIDENCE OF IMPACT:** The evidence base for explicit instruction has shown efficacy for students at all levels of ability and learning capacity, including students who are academically at-risk. The effect sizes for explicit instruction tend to be moderate to large. Relative to explicit instruction, the nature of independent and discovery learning processes can make it difficult to assess impact using experimental designs, generating effect sizes, etc. Correlational research into LRI tends to demonstrate medium effect sizes. **GENERALISABILITY:** LRI is purposefully designed to apply to a wide range of students who differ in terms of prior learning, personal attributes, and ability. LRI Principles #1–5 are designed to enable engagement with learners appropriate to their novice and expert status. To note, there is a strong evidence base on explicit instruction for at-risk learners. There is some evidence for a greater proportion of guided independent application for high ability learners (e.g., as per “expertise reversal” effect under Cognitive Load Theory (CLT). Thus, LRI traverses a wide range of students. **IMPLEMENTATION EASE:** LRI is a concrete, stepwise, practical instructional approach designed to be implemented in the everyday course of pedagogy and learning support. LRI is flexible enough that it can be applied in a range of subject areas and domains and across the course of lessons and programs. **POTENTIAL FOR IMPACT:** Based on experimental, correlational, and meta-analytic research, there is significant potential for impact. Indeed, principles underlying LRI have been adopted by state departments of education (e.g., CESE, 2017; 2018) and suggest high-level support for the potential impact of such approaches.

Authorship

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Related policy and documents

[INSERT RELEVANT POLICY AND DOCUMENTS]

Centre for Education Statistics and Evaluation (CESE). (2017). *Cognitive load theory: Research that teachers really need to understand*. Sydney: NSW Department of Education.

Centre for Education Statistics and Evaluation (CESE). (2018). *Cognitive load theory in practice: Examples for the classroom*. Sydney: NSW Department of Education.

Date of ratification

This policy was ratified on the [INSERT DATE].

Date of review

This policy will be reviewed by [INSERT DATE].

Expert consultation

LRI is designed to be administered without the need for other professional support or resourcing. Notwithstanding this, professional development (and similar) would support its quality implementation across the school. Also, for optimal differentiated application, teachers may consult with learning support staff, other teachers, and relevant counsellors/psychologists (and parents/carers as appropriate).

References

- Archer, A. L., & Hughes, C. A. (2011). *Explicit instruction: Effective and efficient teaching*. Guilford Press.
- Centre for Education Statistics and Evaluation (CESE). (2017). *Cognitive load theory: Research that teachers really need to understand*. Sydney: NSW Department of Education.
- Centre for Education Statistics and Evaluation (CESE). (2018). *Cognitive load theory in practice: Examples for the classroom*. Sydney: NSW Department of Education.
- DeRuvo, S. L. (2009). *Strategies for teaching adolescents with ADHD: Effective classroom techniques across the content areas*. San Francisco: Jossey-Bass.

- Evans, P., & Martin, A. J. (2020). Explicit instruction. In J. Reeve (Ed.), *Oxford handbook of educational psychology*. Oxford: Routledge.
- Liem, G. A. D., & Martin, A. J. (2013). Direct instruction and academic achievement. In J. Hattie & E. Anderman (Eds.), *International guide to student achievement* (pp. 366–368). Oxford: Routledge.
- Kalyuga, S., Ayres, P., Chandler, P., & Sweller, J. (2003). The expertise reversal effect. *Educational Psychologist*, 38, 23–31.
- Kalyuga, S., Chandler, P., Tuovinen, J., & Sweller, J. (2001). When problem solving is superior to studying worked examples. *Journal of Educational Psychology*, 93, 579–588.
- Kirschner, P. A., Sweller, J., & Clark, R. E. (2006). Why minimal guidance during instruction does not work: An analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching. *Educational Psychologist*, 41, 75–86.
- Martin, A. J. (2015). Teaching academically at-risk students in middle school: The roles of explicit instruction and guided discovery learning. In S. Groundwater-Smith & N. Mockler (Eds.), *Big fish, little fish: Teaching and learning in the middle years*. (pp. 29–39). Cambridge: Cambridge University Press.
- Martin, A. J. (2016). *Using Load Reduction Instruction (LRI) to boost motivation and engagement*. Leicester: British Psychological Society.
- Martin, A. J., & Evans, P. (2018). Load reduction instruction: Exploring a framework that assesses explicit instruction through to independent learning. *Teaching and Teacher Education*, 73, 203–214.
- Martin, A. J., & Evans, P. (2019). Load reduction instruction: Sequencing explicit instruction and guided discovery to enhance students' motivation, engagement, learning, and achievement. In S. Tindall-Ford, S. Agostinho, & J. Sweller (Eds.), *Advances in cognitive load theory: Rethinking teaching*. (pp. 15–29). New York: Routledge.
- Martin, A. J., Ginns, P., Burns, E. C., Kennett, R., & Pearson, J. (2020). Load reduction instruction in science and students' science engagement and science achievement. *Journal of Educational Psychology*. doi:10.1037/edu0000552
- Mayer, R. E., & Moreno, R. (2010). Techniques that reduce extraneous cognitive load and manage intrinsic cognitive load during multimedia learning. In J. L. Plass, R. Moreno, & R. Brunken (Eds.), *Cognitive load theory* (pp. 131–152). Cambridge: Cambridge University Press.
- Sweller, J. (2012). Human cognitive architecture: Why some instructional procedures work and others do not. In K. R. Harris, S. Graham, & T. Urdan (Eds.), *APA educational psychology handbook* (pp. 295–325). Washington: American Psychological Association.
- Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. New York: Springer.