



# Load reduction instruction: Exploring a framework that assesses explicit instruction through to independent learning

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## HIGHLIGHTS

- Load reduction instruction (LRI) is an approach to manage cognitive burden on students.
- LRI comprises: difficulty reduction, support/scaffolding, practice, feedback, independence.
- The Load Reduction Instruction Scale (LRIS) assesses these five factors.
- This study investigates the validity of the LRIS and its underlying conceptual contentions.
- The LRIS is a valid means of assessing the teacher's load reduction instructional approaches.

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## ABSTRACT

Load reduction instruction (LRI) is an instructional approach aimed at managing the cognitive burden on students in the initial stages of learning; then, as fluency and automaticity develop, students are encouraged to engage in guided independent learning. LRI comprises five factors: difficulty reduction, support and scaffolding, practice, feedback, and guided independence. This study examined an instrument (the Load Reduction Instruction Scale, LRIS) aimed at assessing these five factors. Among a sample of high school students from 40 classrooms, findings supported the validity of the LRIS, the conceptualising underpinning it, and its potential to guide instructional practice.

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## 1. Introduction

As students progress through elementary, middle and high school, there is an escalation in homework, frequency of assessment, content to be covered, and subject difficulty. This escalation in academic challenge places increasing cognitive demands on students (Sweller, 2012) and brings into consideration the importance of approaching instruction in ways that help manage the cognitive burden on learners (Kirschner, Sweller, & Clark, 2006; Mayer & Moreno, 2010).

Recently, “load reduction instruction” (LRI; Martin, 2016) was

introduced as an umbrella concept representing instructional models that seek to manage the cognitive burden on students as they learn. As described below (see also Fig. 1), LRI encompasses five key principles: (1) reducing the difficulty of instruction during initial learning, (2) instructional support and scaffolding, (3) ample structured practice, (4) appropriate provision of instructional feedback, and (5) independent application. Martin (2016) identified the need to develop instrumentation to empirically assess these five principles. The present study is the first to operationalise and validate these key principles in the classroom setting using the Load Reduction Instruction Scale (LRIS).

### 1.1. Rationale for the LRI framework and instrumentation

There are practical, empirical, and theoretical grounds for the LRI framework and instrumentation. In practical terms, one of the

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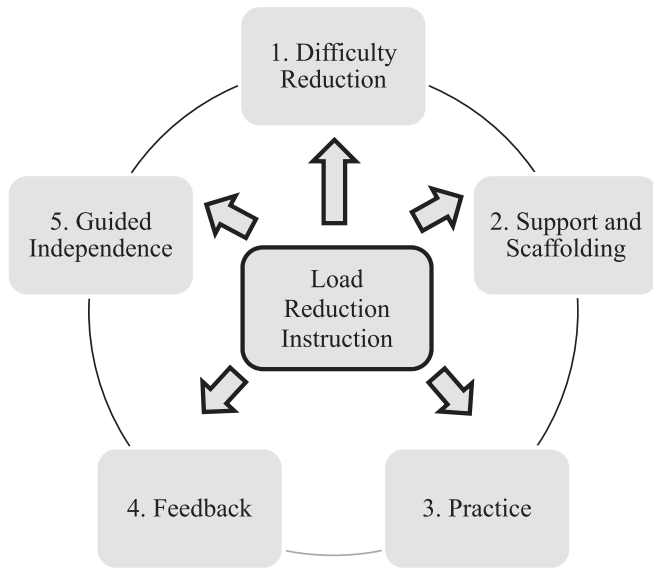


Fig. 1. Load Reduction Instruction (LRI) Framework – adapted from Martin (2016).

major challenges facing teachers is to deliver instruction to diverse learners. For personal and contextual reasons, students in most classrooms will comprise a diverse range of skill and knowledge (Mayer & Moreno, 2010). Because of this, instructional approaches that can accommodate the different skill and knowledge sets in the classroom have potential to assist students to learn more effectively. When students are relatively new to the skill and knowledge set, they may benefit from more explicit approaches that seek to ensure the basic skill and knowledge are learnt. Importantly, however, as these learners develop in their skill and knowledge there is greater opportunity and benefit in more autonomous learning (Martin, 2016). As detailed in the Introduction and Discussion below, the LRI framework and accompanying instrumentation formally operationalise these approaches and seek to offer teachers opportunities to better understand and refine their practice. Moreover, the development of instrumentation that has links to a body of practice-related advice (see Martin, 2016 for a description of LRI practice-related implications; and see indicative practice advice in Discussion below) enables teachers to collect data on their own instruction, either through student assessment of their teaching (as in the case of the present study) or through teachers' self-assessment (e.g., asking teachers how they think students might rate them on each LRIS item). Thus, for example, if learners are struggling with subject matter or teachers are struggling to communicate it to them, data collected using the LRIS may be one part of the teacher's efforts to understand the pedagogical process as it pertains to the cognitive demands of the task (in Discussion we outline numerous ways that the LRIS can be used by teachers, depending on time and resources available).

In theoretical terms, there have been ongoing tussles between predominantly constructivist (and post-modernist) instructional approaches and predominantly explicit (positivist and post-positivist) instructional approaches (Martin, 2016; see also; Tobias & Duffy, 2009). The former perspective tends to center on discovery- and enquiry-based approaches. The latter perspective typically centers on explicit and direct instruction. LRI holds that both are compatible when, having developed requisite skill and knowledge, learners are encouraged to apply the acquired skill and knowledge in independent, novel, and creative ways (Martin, 2016). LRI thus challenges narrow conceptions that explicit and discovery approaches are mutually exclusive and contends that

such conceptualising represents a false dichotomy.

From an empirical perspective, because the bulk of load-reduction-oriented research (e.g., cognitive load research) has tended to be experimental, there is a need to develop instrumentation that can readily be applied in correlational research and research situated in more naturalistic group settings such as classrooms. Particularly with regard to the latter point, much experimental research into the cognitive elements of student learning is not conducted in classrooms; exploring key elements of instruction in naturalistic settings helps round out what research using experimental designs has found. An additional yield of classroom-based research is that if data from enough classrooms are collected, researchers can explore class-level effects, not just student-level effects. The present study thus introduces the Load Reduction Instruction Scale (LRIS) and explores its internal psychometric properties, as well as its external validity with motivation, engagement, buoyancy, cognitive load, and achievement factors.

### 1.2. LRI in the context of educational effectiveness research

Indeed, these multilevel considerations bring into focus salient theory and research under the educational effectiveness research umbrella. Educational effectiveness research investigates what works in classrooms and schools and why it works (Creemers, Kyriakides, & Sammons, 2010), with particular emphasis on the multiple levels that impact student achievement (Teddlie & Reynolds, 2000). In their recent review of educational effectiveness research, Reynolds et al. (2014) noted that early such research tended to harness theoretical perspectives that borrowed from theories in other disciplines (e.g., contingency theory to discuss contextual variation; coalition building to discuss successful leadership in effective schools). However, in the past two decades there have been developments in theories of educational effectiveness and under which LRI might be considered to operate. One such development—the dynamic model of educational effectiveness—has sought to provide a comprehensive perspective on education by relating factors that dynamically operate and interact at different levels (viz. students, classrooms, schools, system) to outcomes of schooling (Creemers & Kyriakides, 2008; Kyriakides, 2008).

The upper level of the dynamic model refers to the influence of the educational system on schools, especially through educational policy at the national/regional level and factors such as the values of society for learning. At the next level, the dynamic model refers to school-level factors such as school policy on teaching and learning that influence the teaching–learning situation. The final two levels are given some emphasis in the dynamic model. They refer to the roles of the two main actors: teacher and student (Creemers & Kyriakides, 2008; Kyriakides, 2008). As Kyriakides and Creemers (2009, p. 63) note: “teaching is emphasised and the description of the classroom level refers mainly to the behaviour of the teacher in the classroom and especially to his/her contribution in promoting learning at the classroom level”. It is this part of the dynamic model with which we contend LRI and the LRIS are implicated. LRI is about the instructional and learning approaches used by teachers and students and the instruction and learning nexus between these two actors. Thus, LRI might be considered a cognitive psychological implementation of this part of the dynamic model of educational effectiveness.

Cross-sectional and longitudinal research has supported links between key factors within each level of the dynamic model and academic outcomes traversing achievement (Creemers & Kyriakides, 2008, 2010), language learning (Kyriakides & Creemers, 2011), and social outcomes such as bullying reduction (Kyriakides et al., 2014). More recently, meta-analysis has shown

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