Self-regulated learning in the classroom

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Introduction

Project Background

A previous Assessment Research Centre study "Assessment and Learning Partnerships" showed that despite overall average gains in student reading and mathematics, almost all the gains were achieved among the bottom quartile group of students and at low levels of proficiency in both reading and mathematics. This phenomenon was referred to by Professor Patrick Griffin as "flatlining" (Topsfield, 2013). The lack of impact among high capacity students (top 25% of a class in a particular subject) at the higher levels of proficiency was alarming in reading and extremely serious in mathematics. Analysis of value-added achievement at the teacher level showed that there were variable impacts between teachers at every level of proficiency, and within teachers, there was variable impact across levels of proficiency.

The Assessment Research Centre, in partnership with the Department of Education and Training, conducted research into "Realising the Potential of Australia's High Capacity Students" (REAP). The project involved two data collection years, 2016 and 2017, where 58 schools asked teachers of Years 5 to 8 to assess students in March/April (T1) and then in September/October (T2) to determine their growth in mathematics. Concurrently, teachers read and completed eight professional development (PD) modules focusing on Identifying High Capacity Students, Zone of Proximal Development (ZPD), Rubrics, Assessment for Growth, Students' Self-Regulated Learning (SRL), Teaching SRL in the classroom, and Targeted Teaching and Monitoring Progress. Teachers participated in the project to try to ameliorate the flatline through capitalising on their students' ability to regulate their own learning and targeted teaching at the student ZPD.

To assess students' SRL behaviour and to create a developmental continuum that describes the progression of SRL behaviours in the classroom, a student self-report measure was created and validated. To assess teachers' use of teaching practices that foster student SRL in the classroom and to create a competency-based progression to describe the level of skill that teachers employ in their SRL classroom practices, a teacher self-report questionnaire was also created and validated. This report describes the creation and validation of these measures, along with validation considerations and findings related to the data obtained from the measures.

Self-Regulated Learning[1]

Traditionally, differentiation and individualised teaching and learning have been thought of as the domain of the teacher, where the teacher plans for and implements classroom strategies for student engagement. Self-regulation shifts this emphasis onto the learner, requiring them to be active participants in their learning. That is, learners become responsible for negotiating outcomes, approaches and strategies for achieving those outcomes. The skills required for responsible, active learning can be developed through teacher instruction and encouragement, as well as through deliberate practice of elements of self-regulation. As a means to life-long learning, SRL is a constant goal for everyone, including both teachers and students.

Active, independent learners are aware of and take control of their learning. Self-regulation in learning involves deliberate selection and use of strategies to set direction and understand and plan processes that mediate between person, context and achievement. That is, the learner develops strategies for negotiating distractions and input from others in the classroom, the classroom environment (including school culture) and planned, successful learning.

SRL is a goal-driven process in which the learner monitors and regulates internal abilities (what they can do) and responses to negotiate external environments. It encompasses a teachable set of skills and strategies that can be explicitly taught or learned though observations or modelling (Boekaerts & Corno, 2005; Pintrich, 2004; Zimmerman & Campillo, 2003; Zimmerman & Schunk, 1989). An example of a set of skills that is explicitly taught and modelled in the classroom and that develops learner self-regulation can be seen in whole-class goal setting, which progresses to individual goal setting.

Optimal school environments are those in which self-regulation is developed at three specific levels:

1. Teacher: Teachers own SRL behaviours and practical approaches to fostering students' SRL skills.
2. Collaborative teaching teams: Teams own SRL behaviour and support teaching of student SRL.
3. Student: Self and peer SRL behaviour.

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[1] Some of this content is also presented in Griffin, P., English, N., Nibali, N., Harding, S-M., Graham, L. (2017). Self-regulated learning. In P. Griffin (Ed.), *Assessment for teaching* (2nd ed.) (pp. 141–160). Cambridge, England: University Press.

Benefits of self-regulated learning

Students benefit from using SRL behaviours as they learn to persist with challenging problems to find solutions and experience success and satisfaction for the effort they have expended. When students become more active and responsible for their learning, they set goals for themselves, complete expected tasks and review their completed work to determine what they have learned. As students regulate their own learning, they are able to increase their independence and proficiency, increasingly developing, adapting and accessing learning opportunities beyond those envisioned by their teachers (Ramdass & Zimmerman, 2011; Winne, 1997).

Self-regulated learning phases

An influential model of self-regulated learning developed by Zimmerman (2000) posits that there are three "cyclical" phases to SRL (refer to Figure 1).

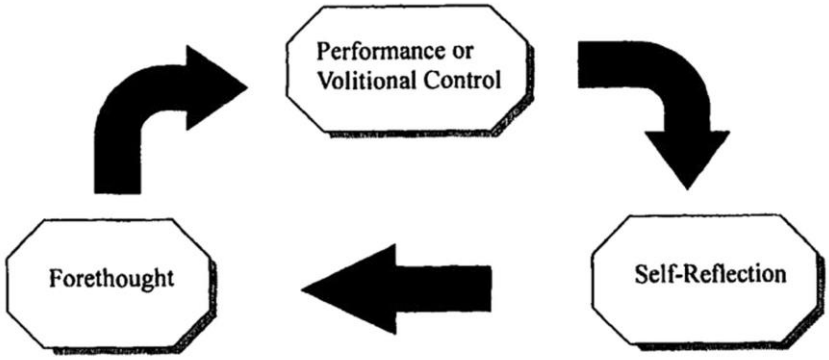


TABLE 1 Phase Structure and Subprocesses of Self-Regulation

Cyclical self-regulatory phases		
Forethought	Performance/volitional control	Self-reflection
Task analysis Goal setting Strategic planning	Self-control Self-instruction Imagery Attention focusing Task strategies	Self-judgment Self-evaluation Causal attribution
Self-motivation beliefs Self-efficacy Outcome expectations Intrinsic interest/value Goal orientation	Self-observation Self-recording Self-experimentation	Self-reaction Self-satisfaction/affect Adaptive-defensive

Figure 1. Cyclical phases and sub-processes of self-regulated learning (Zimmerman, 2000).

This original model has been modified over time, with the last update published by Zimmerman and Moylan (2009), including more capabilities within the "self-control" element of SRL (Figure 2).

Many other conceptions of conceptual frameworks describe SRL processes (see Boekaerts & Corno, 2005; Efklides, 2011; Pintrich, 2000; Winne & Hadwin, 1998). While the Zimmerman and Pintrich (and to some extent Winne and Hadwin) models are cyclical in nature, with a goals/forethought/intentions phase, an

action/strategy/performance phase and a reflection/monitoring/self-judgement phase, other models do not explicitly make a clear distinction between phases and see SRL as more of an "open" process (see Boekaerts & Corno, 2005; Efklides, 2011). The frameworks share more similarities than differences, as evidenced in a review of SRL models (Panadero, 2017), with one benefit of using a cyclical model being clarity of instructional intervention from a teacher. The second group of models that describe SRL as a continuous and holistic skill set implies that there could be one overarching latent construct describing SRL skills, an approach utilised by the REAP study, despite using the cyclical Zimmerman model to create indicators of SRL behaviour.

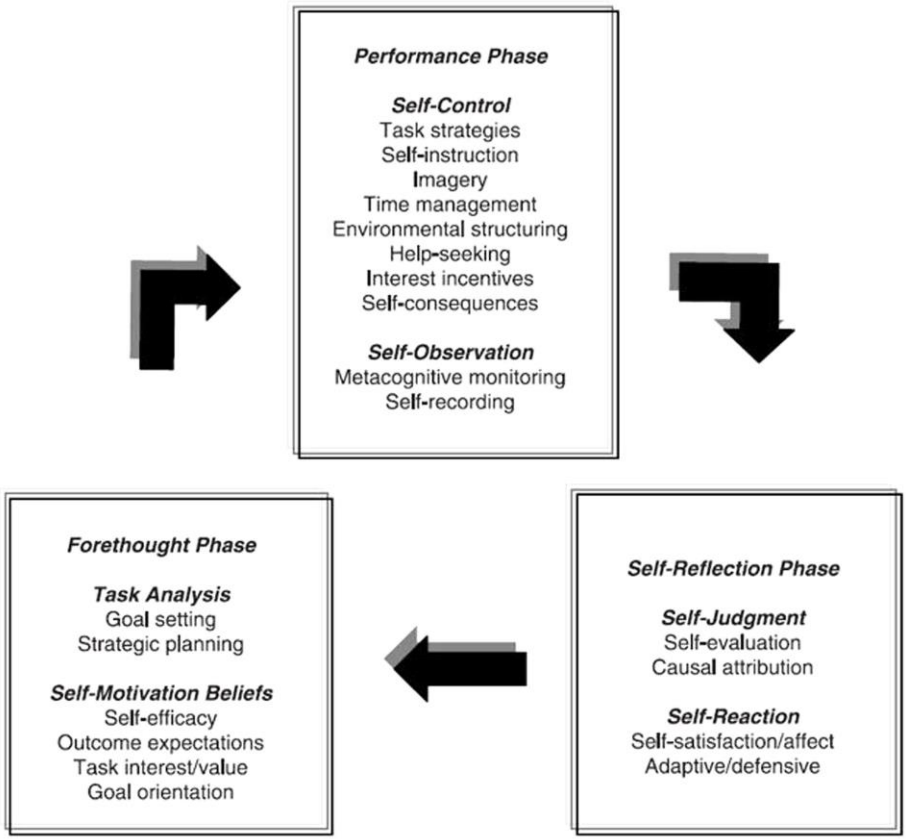


Figure 2. Current version of cyclical phases model (Zimmerman & Moylan 2009).

A summary of the phases within the Zimmerman cyclical model (Zimmerman & Campillo, 2003) follows.

Forethought

This phase involves task analysis, planning and activation of learning through self-awareness and control of underlying motivations. In this phase, students analyse the components of a task, as well as the level of difficulty and effort required, and decide on outcomes accordingly. Highly self-regulated learners analyse the learning task, set goals and plan strategies prior to commencing learning. In the forethought phase, students are aware of their motivation for initiating and sustaining effort and draw on these motivations to support their perceptions of self-efficacy and fuel their outcome expectations. The interest and value

students place on learning can impact whether the overall motivation for completing a task is to obtain or increase competence and skills (mastery goals) or for the sake of competitive success (performance goals). Some examples of skills that beginner and skilful self-regulated learners exhibit in the forethought phase are listed in Table 1.

Table 1. Beginner and skilled SRL forethought phase behaviours

Forethought Phase	
Beginner Self-Regulated Learners	Skilful Self-Regulated Learners
• Set no or non-specific distal goals – may have a general idea of the overall outcome targeted • Are disinterested – may come to a learning situation just because they have been told to • Wait to be directed • Select strategies randomly • Are over- or under-confident when comparing ability to the level of difficulty and effort required to complete the task	• Set specific hierarchical goals – small goals leading to larger goals • Are intrinsically interested and motivated to learn • Plan their approach to learning • Select learning strategies in line with task/goal • Accurately analyse the task for level of difficulty and effort required and select strategies to mediate these and perceived level of ability • Know both what to learn and how to learn

Performance

Students make use of planning from the forethought phase by implementing and remaining aware of strategies used throughout the performance phase. To ensure and sustain focus on their intended outcomes, students are deliberately aware of their strategic approach, actions, emotions and motivations and regulate their behaviour and learning strategies for the purpose of remaining on track to achieve their goal or, if need be, alter their goal according to changed conditions. Students use self-observation and feedback to monitor their progress and motivation. Highly regulated students can articulate and explain their chosen strategies and thinking and can defend a chosen approach. They record successful strategies and/or processes used for future reference and use (for example, the working out of a mathematics problem or drafting of a story, or use learning logs that can be referred back to and linked to subsequent learning activities).

The ability to recognise when attention on a task is under threat and then drawing on strategies to bring focus back to their immediate learning is an important skill in the performance phase of self-regulation.

Some examples of skills that beginner and skilful self-regulated learners exhibit in the performance phase are listed in Table 2.

Table 2. Beginner and skilled SRL performance phase behaviours

Performance Phase	
Beginner Self-Regulated Learners	Skilful Self-Regulated Learners
• Are easily distracted and move off track • Cannot imagine themselves at the completion of the intended task • Are unaware of the quality of their performance • Have fewer strategies to choose from • Fail to recognise and relate previous similar learning experiences • See themselves as victims of the learning process	• Focus on performance rather than solely outcome • Picture the process and outcome as a means for remaining on task • Monitor performance and learning while it is happening • Are disciplined and use practice strategies to consolidate learning • Have a larger repertoire of strategies from which to choose • Make links to prior experiences/learning • Take ownership of and control their learning process

Self-reflection

The self-reflection phase occurs after the completion of parts or the whole of the learning experience. It is the phase concerned with evaluating and judging performance against the standards established in the forethought phase by virtue of the goals and strategies students selected at that time. Level of achievement and competence is determined by the students' comparison of outcomes to their intended outcomes identified in relation to the goals determined in the forethought phase. This phase requires students to use observations and feedback to evaluate their results and performance and formulate causal attributions. Causal attributions refer to the student ascribing factors they perceive have led to the outcome achieved. These factors may include their approach or level of effort, their level of competence and task difficulty, their selection and implementation of strategies and other elements of their performance that they attribute to the final outcome. Perceptions regarding levels of success have direct impact on students' ongoing motivation and their approaches to learning (which are particularly important in the forethought phase). Students' selection of goals or strategies in the future can be predicated on whether the outcomes they experienced led to feelings of satisfaction or dissatisfaction. Skilful self-regulated learners are aware of these feelings and how they impact on their decision making

and use personal strategies to balance the need to avoid dissatisfaction with the need to complete a task or undertake a learning process. Some examples of skills that beginner and skilful self-regulated learners exhibit in the self-reflection phase are listed in Table 3.

Table 3. Beginner and skilled SRL self-reflection phase behaviours

Self-Reflection Phase	
Beginner Self-Regulated Learners	Skilful Self-Regulated Learners
• Avoid feedback and self-evaluation • Do not attribute outcomes to actions or behaviour • React negatively to dissatisfaction with avoidance or procrastination • Blame others for their lack of success	• Seek feedback for self-evaluation • Make connections between actions and learning strategies and performance and outcomes • Positive self-reaction includes adapting to mediate dissatisfaction • Attribute failure to correctable causes

Self-regulated learning skills and behaviours

SRL can be encouraged from a very early age. Researchers have identified that deliberate intervention can improve SRL skills in pre-school children and put them well on the path to regulating their own learning. It cannot be assumed that developing as a skilful self-regulated learner will occur unaided and without explicit modelling and instruction and opportunities for pre-school children and students to practice SRL strategies (Butler, 2002; Dignath, Buettner, & Langfeldt, 2008; Jones, 2007). Teaching SRL involves giving students more and more control over their learning while encouraging a general awareness of motivation that underlies engagement and provides reasons for individuals' selection of learning strategies.

Parents, family, peers, teachers, our social connections and specific situations are some of the many factors that impact the ability to regulate learning. In addition, each member of the classroom influences other members' learning and each has a unique repertoire of strategies for approaching their learning. So, how do we identify approaches that include self-regulation of learning in the classroom? How are these strategies different from teacher-regulated strategies? The short answer is that SRL strategies are, by and large, deliberately initiated and implemented by the student. A basic comparison of teacher- and student-regulated strategies in the classroom is shown in Table 4.

Table 4. Teacher vs. student SRL strategies

Teacher-Regulated Strategies	Student-Regulated Strategies
• Teacher plays a central role in the regulation of students' behaviours. • Teacher identifies, sets, monitors and reinforces strategies for student learning. • Teacher controls student behaviour and their access to strategies for learning. • Student follows the teacher's instructions.	• Student is in control of their own behaviour without being prompted by the teacher. • Student draws from a repertoire of strategies that they have developed from, for example, observing others, direct teacher instruction, prior learning experiences, and from assessing their learning environment.

Careful observation of students is crucial in the identification of individual and group levels of SRL. Observations of students in several learning situations help teachers to identify strengths and challenges related to SRL. Observations also help teachers establish whether and how students apply SRL skills consistently, some of the time, or only in relation to specific situations. Students, for example, may demonstrate high levels of planning and goal-setting skills when they are reading a text and taking notes in the classroom, but may procrastinate and lose focus when it comes to answering comprehension questions or researching during library time. Observations of students in a number of learning situations underpin teacher identification of student levels of SRL skills in consistently controlling their learning in the classroom.

Along with careful teacher observation, a self-report questionnaire of students' SRL behaviours was created as part of the REAP project. This is described in the "Methods" section and results are presented.

Teaching Self-Regulated Learning

When teaching students how to use SRL behaviours to benefit their educational experience, it might be helpful to (a) co-construct strategies based on a real problem using discussions that occur between teacher, student and peers and (b) build on students' existing knowledge and skill. It is important to teach students SRL skills at their ZPD for SRL, just as teachers would go about teaching any content area. The SRL measure for students, created during the REAP project, provides a source of evidence for teachers when identifying their students' SRL ZPD.

Some key features of the approaches and strategies for self-regulated learning include

- Observation – the student observes processes modelled by others, verbal descriptions, guidance, feedback
- Imitation and practice – the student emulates self-regulated learning behaviour

- Internalisation – the student uses the strategy independently
- Recording – the student records successful strategies and monitors progress
- Monitoring – student (and teacher) reflect on use of strategies and controls future behaviour accordingly.

Central to these strategies is student awareness and deliberate engagement with SRL.

High capacity students engage in more complex situations that often demand higher levels of SRL. Skilful self-regulated learners systematically adapt their learning strategies to independently meet the demands of changing personal and contextual situations. Reis and Green (2002) recommended that teachers use the following practices to support high capacity students (as well as other students) in their development of SRL skills:

1. Guide students' self-belief, goal setting and expectations by
   - developing background knowledge
   - discussing specific SRL strategies
   - modelling or instructing in SRL strategies
2. Provide access to reflective dialogue (including strategies for self-talk)
3. Provide corrective feedback
4. Help students develop strategies for making connections between abstract concepts
5. Help learners automatically link new experiences with prior learning
6. Require learners to reflect, evaluate and record successful strategies and processes for mitigating unsuccessful strategies.

Teachers' SRL practices in Victorian classrooms

While there is an abundance of available literature that recommends methods that teachers could use to support students' SRL skills (e.g., Biggs & Tang, 2010; Butler, 2002; Dignath et al., 2008; Jones, 2007; Paris & Paris, 2001), there is a lack of research into the current practices of Victorian teachers.

The researchers of the REAP project felt that teachers needed a method to evaluate their current SRL classroom practices and a way to focus on improving their current SRL teaching based on their own ZPD. A competency-based progression of classroom practices related to teaching students SRL behaviours was thought to meet these needs. Coupled with questions that teachers responded to on the completion of PD-related materials, this provided information on how teachers are implementing SRL-based instruction in their classrooms and which areas might need focus for the future. Further analysis allowed comparisons of how primary and secondary teachers are implementing SRL in their classrooms.

Research Questions[2]

1. What levels of SRL behaviour do students in Grades 5 to 8 exhibit in Victorian classrooms?
2. Does the student's SRL level vary depending on grade?
3. Does the student's SRL level differ depending on the subject domain?
4. Is there a relationship between SRL and student achievement in mathematics or reading comprehension?
5. What levels of SRL classroom practices do teachers exhibit in Victorian classrooms?
6. Does the teacher's SRL level vary depending on school type (primary or secondary)?
7. What are Victorian teachers views on planning for and teaching SRL?
8. Which challenges do Victorian teachers experience when planning for, teaching or assessing SRL?

Method

Participants

Students in Grades 5 to 8 from 42 Victorian public schools along with 127 of their teachers were involved in this study. The numbers of participants per questionnaire vary as involvement was voluntary on behalf of the teachers. Numbers will be documented in the appropriate results section. A total of 4,232 students completed the student SRL questionnaire in March/April so teachers could utilise a student's level as a source of evidence to identify their SRL ZPD.

Student SRL Questionnaire

To measure SRL behaviours in terms of levels of quality for each student, students completed an online self-report questionnaire, facilitated by the teacher of the class. The SRL questionnaire was based on the phases, elements and capabilities described by Zimmerman and Campillo (2003). Capabilities that support SRL were used to design 27 items asking students to report what they would do in specific learning circumstances. Options were coded from 0 to 3, 4 or 5 on a hierarchical scale. A schematic of the construct used for item design is presented in Figure 3. The test blueprint framework was based on the approach created by Griffin (2007) and explained in Woods and Griffin (2013) to collect evidence of student behaviour based on what a student can "do, make, say or write" (Griffin, 2014, pg. 21).

In initial workshops with teachers, student behaviours in terms of each capability were ordered low, medium and high to create a theoretical construct underpinning the skills in order that students' SRL

[2] Some of the methods and results presented in this report in response to these research questions have been published or are soon to be published in refereed journal articles by the same authors.

behaviours and motivations could be mapped from low to high (refer to criteria listed in Figure 3). Items were created to reflect the quality criteria in language suitable for 10- to 14-year-old students. Coding for the hierarchical scale of the responses was based on the theoretical frameworks described by Krathwohl, Dreyfus or Bloom (Bloom, 1984; Dreyfus & Dreyfus, 1980; Krathwohl, Bloom, & Masia, 1964), with a "motivation for learning hierarchy" used for some items. Each item was written based on levels of skill from one of these taxonomies in conjunction with the teacher-collected data. Items were chosen so that they complied with test specifications, which were drawn up through a thorough examination of current SRL literature, including but not limited to the Zimmerman framework.

Depending on the item, the relevant taxonomy was applied to create hierarchy in the response order based on the stem of the item. Importantly, item responses were not presented in hierarchical order for the students, so they could not eventually deduce the pattern of the "correct" or best response to select; for an example, refer to Figure 4. Students did not know which response they were "supposed" to select; they just selected which response best fit them as a learner, creating a non-biased response pattern.

Separate SRL questionnaires were constructed for mathematics and for reading; however, the only difference was the use of the term "mathematics" or "reading" in the stem of each question (for example, "When completing a mathematics task . . ." vs. "When completing a reading task . . .").

As many of the capabilities in the SRL construct speak to the student's intrinsic motivation or inner monologue (see Figure 4 as an example), it was decided that a self-report was a valid way to measure students' SRL behaviours. Cog labs of students during the piloting process of the questionnaire indicated that students in the age range 9 to 12 years were exceptionally honest, many willingly choosing the lowest response option even when negative language was used (e.g., "I don't care about learning"). The questionnaire was administered online by the regular classroom teacher.

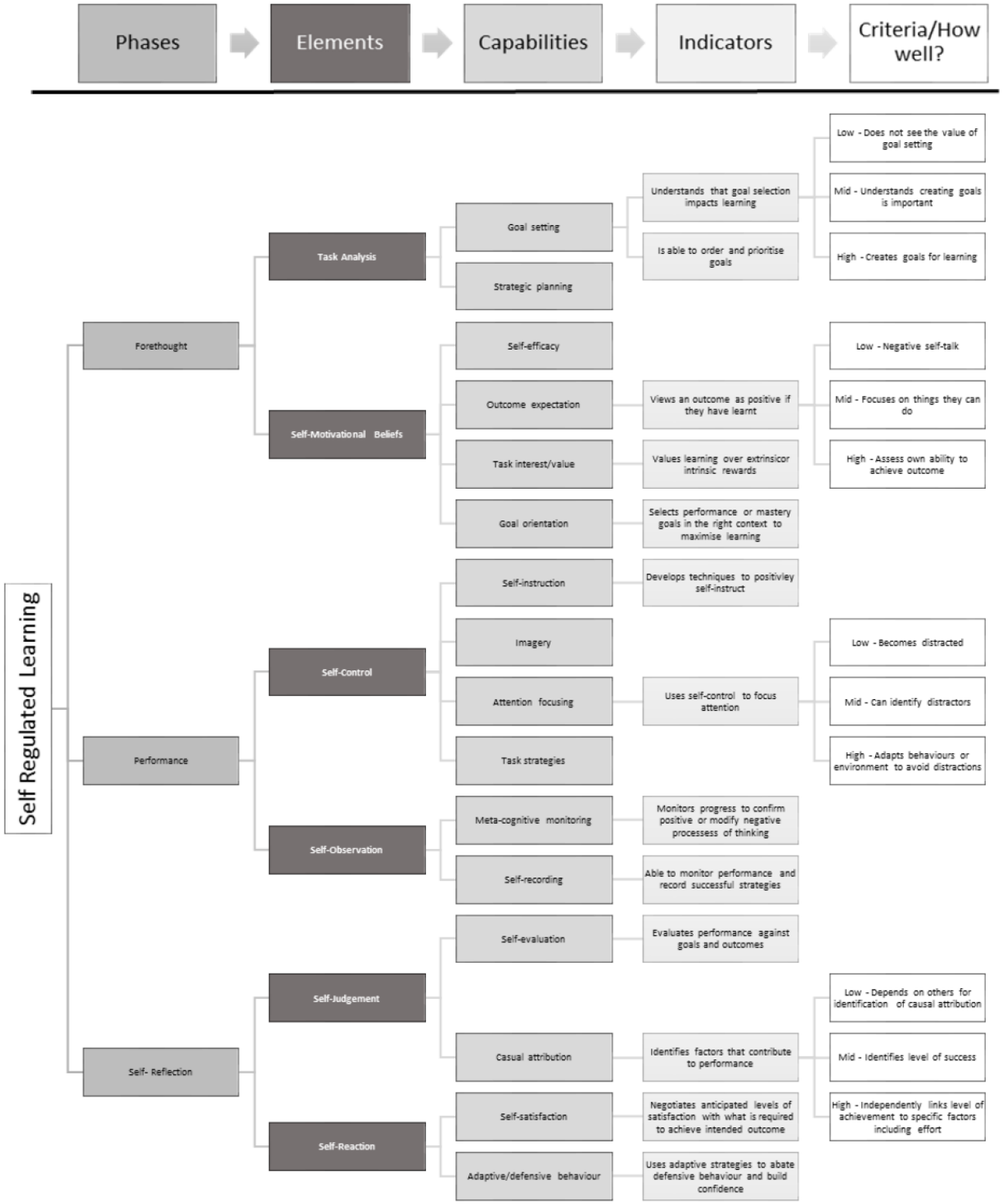


Figure 3. Schematic of SRL construct used for item design.

Note: Based on Zimmerman and Campillo's (2013) SRL model and Griffin's (2007) approach to item design. Only some indicators and quality criteria are listed due to space restraints.

1 When I think about why I want to do well on a mathematics task…

- ☐ I want my friends and teacher to think I am clever
- ☐ I don't think about why I want to do well
- ☐ I want to learn from doing the task
- ☐ I want to get all the answers right

1. When I think about why I want to do well on a mathematics task…

a)	I don't think about why I want to do well	(none) - 0
b)	I want my friends and teacher to think I am clever	(to please others - positive extrinsic motivation) - 1
c)	I want to get all the answers right	(for a reward – positive intrinsic/extrinsic motivation) - 2
d)	I want to learn from doing the task	(Inherent joy – positive intrinsic motivation) - 3

Figure 4. Example item from student SRL questionnaire.

Note: The top item is in the format presented to the student. The student clicks on the response that best matches "What are you most likely to do in class". The lower item format is ordered in terms of the motivational hierarchy. Item response codes range from 0–3.

Process of tool development

1. Construct definitions

The definition of SRL in the classroom was decided as "an academic process in which learners systematically and intentionally monitor aspects of their thinking, motivation and behaviour in response to internal and external environments". Capabilities that support SRL were thought to include task analysis, self-motivational beliefs, self-control, self-observation, self-judgement and self-reflection, as shown in the Zimmerman model (Figure 1). Each capability and element was given a documented definition with reference to literature that was made available for teachers in Step 2.

2. Quality criteria

After definitions were decided, 78 teachers and principals representing 33 primary and secondary Victorian schools workshopped each capability/element, describing student SRL learning behaviour at low, medium or high levels.

3. Questionnaire development

Items were created based on the indicators and the quality criteria informed by teacher information (Figure 3). Items were linked to either Krathwohl, Bloom, Dreyfus or motivation taxonomies.

4. Student cog lab

Grade 5/6 students (n = 9) in groups of three (teachers designated low, middle or high to students in terms of reading capability) underwent a cog lab "think aloud" process with the three researchers. The questions

were checked for student understanding to ensure the language was interpretable for each competence level; all items were understood to some degree. After cog labs, some item language was changed; for example, not all students knew what the term “motivated” meant. The language was simplified so students of relatively low reading comprehension could respond to each question.

4. Student pilot

Students (n = 89) from Grades 5 and 6 piloted the instrument: person reliability was 0.813.

6. Panelling

Items were panelled by experts, including Emeritus Professor Patrick Griffin.

7. Item/questionnaire finalisation

Results of cog lab, student pilot and panelling were considered and items were finalised. Questionnaire was finalised in three versions: mathematics, reading and problem solving. Questionnaires were programmed onto the “REAP Online” platform.

8. Administration

Students completed the questionnaire online when prompted by the teacher. The questionnaire took approximately 10 minutes to complete. Students were assigned a level of SRL behaviour only if they completed all questions. Students could save the questionnaire and resume later; however, this was not common, with nearly all students finishing the questionnaire in one sitting.

Teacher SRL Questionnaire

The teacher SRL classroom practices questionnaire was prepared following the same process as the student questionnaire except that neither a cog lab nor a pilot was carried out with teachers. The aim of the measure was to assess the level of teachers’ ability to explicitly teach the SRL skill set to their students. Considering the need to increase the sample size for teachers completing the questionnaire, it was decided that the full cohort of 127 teachers involved in the research would be required to complete the final questionnaire, so preliminary checks were forfeited. The teacher assessment contained fewer items (n = 16) than the student tool (n = 27), where one item was constructed for teaching each of the capabilities described by the construct (refer to Figure 3).

The teacher instrument was presented somewhat differently to the student questionnaire, in that all response options were ordered based on the quality criteria and were not “jumbled” (Figure 5).

As the items for the teacher assessment tool and the items for the student assessment tool were based on common capabilities (i.e., either demonstrating the SRL capability (students) or teaching the capability (teachers)), there were parallels in the constructs tested.

13. Regarding self-evaluation, I teach my students to…

☐	rely on teachers and parents to determine their level of performance	1
☐	evaluate their own performance	2
☐	use their own, teacher and parent feedback to evaluate their performance	3
☐	I don't discuss self-evaluation	0

Figure 5. Example item from teacher SRL classroom practices.

Note: Coded as per numerical values to the right; codes not visible to teachers.

Questionnaire Analyses

The student SRL questionnaire was completed by 4,232 students and the teacher classroom practices questionnaire by 124 teachers (three teachers did not respond); both questionnaires were analysed using a partial credit model on ConQuest software (Wu, Adams, Wilson, & Haldane, 2007). Individual steps of each item were examined to confirm fit to the model and that the plausible value of the average ability of each item step was consistent with the hypothetical continuum of the latent trait. This was to confirm that the response probability increases with higher values of θ (student or teacher ability).

Student and teacher ability estimates were calculated as weighted likelihood estimates (WLE) obtained based on the procedure described by Warm (1989). Student/teacher ability and item difficulty were interpreted on the same scale, with units referred to as logits.

Other questionnaires relating to SRL practices were in the form of multiple-choice, short response or open-ended. Teachers were often allowed to select multiple responses from those presented. These questionnaires were analysed using basic frequency, percentage and qualitative methods.

Results

Student SRL Behaviours

The student and teacher assessment tools produced a posteriori/plausible value (EAP/PV) separation reliability of 0.87, indicating internal consistency and evidence for construct validity. For estimation of parameters, average indicator difficulty was arbitrarily set to zero, while student ability estimates were allowed to vary. The range of latent student ability estimates was compared to the range of indicator difficulties to check that the items were appropriately matched to students' abilities. Item and person separation reliabilities were 0.99 and 0.86, respectively. This indicates that the items' facility to map SRL was appropriate over the range of student abilities tested. The mean of the latent ability distribution was 0.66 logits (standard error 0.011), indicating that the indicators were well-matched to students' abilities.

Item difficulty estimates were compared for each of the three versions of the student questionnaire (mathematics, reading comprehension and problem solving) to determine whether a consistent latent continuum was described by the data from each subject domain or whether the progression of SRL skills in general differed by subject.

Differential item functioning (DIF) was carried out between subject versions. No items were found to exhibit DIF based on the subject in question. Scatterplots describing the relationship between item difficulty based on subject versions are presented in Figure 5. The coefficient of determination (R^2) between subject versions was 0.96: problem solving and mathematics; 0.96: problem solving and reading comprehension; and 0.97: reading comprehension vs mathematics. As there were no significant differences between the ordering of the items on any of the subject versions, there was evidence of unidimensionality in the SRL construct and only one progression of skills was written for all three subject versions.

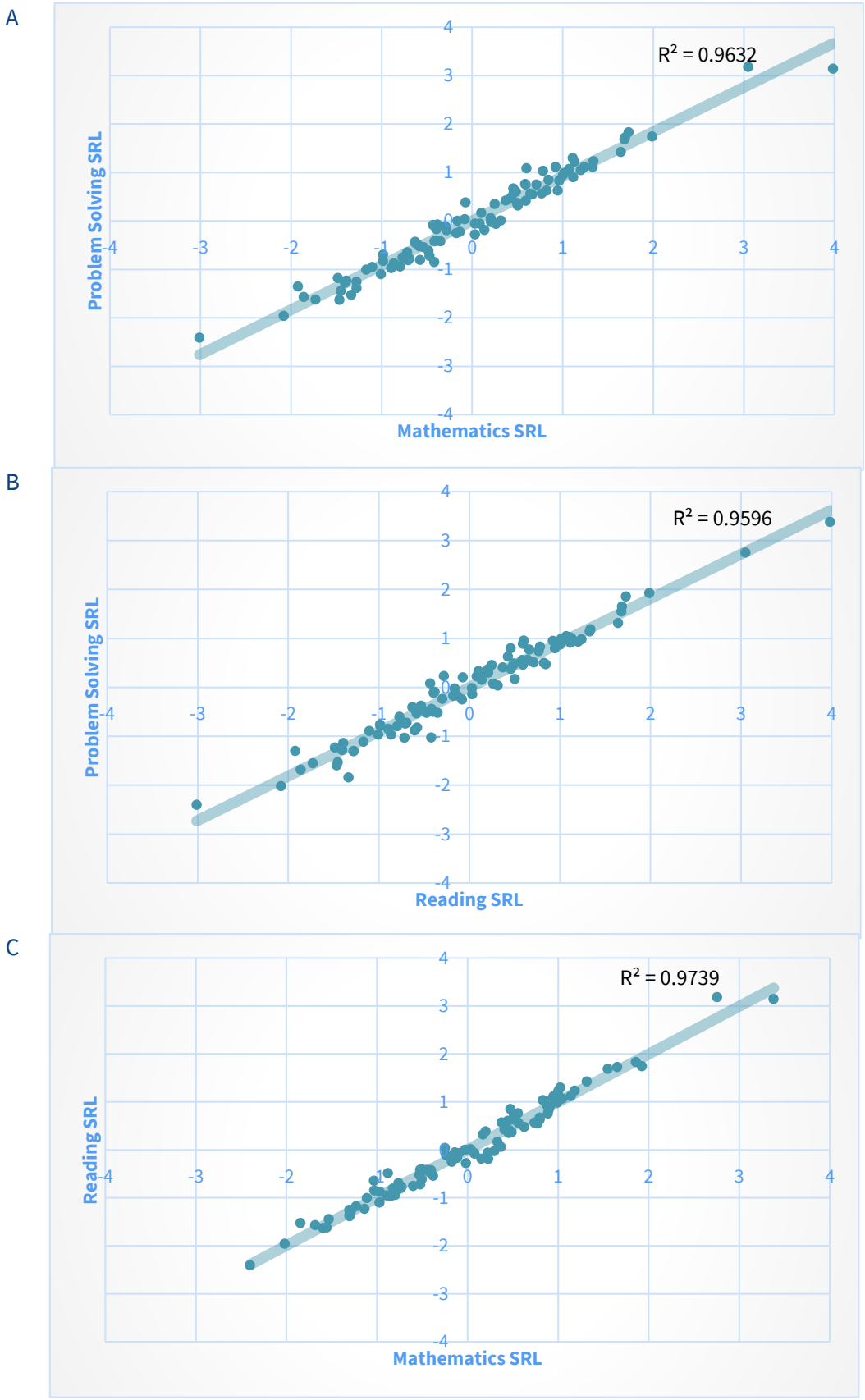


Figure 6. Item difficulty estimate comparisons between subject area questionnaire formats: (A) problem solving vs mathematics, (B) problem solving vs. reading comprehension and (C) mathematics vs. reading comprehension.

The data from all three subject versions of the questionnaire was combined and analysed as one instrument; item analysis supported the notion that items fit the Rasch model in that there was one underlying latent continuum measured. Average item-rest correlation was 0.45.

Step item difficulty estimates (thresholds) were transformed into written descriptions of skill levels to form a progression of students' SRL skill, as described by a process published in Woods and Griffin (2013). In short, clusters of items were identified based on there being a logical substantive meaning behind the behaviours that grouped at successive levels of increasing difficulty. Using this method, seven levels defining perceptible increasing levels of SRL behaviour were identified.

The progression of students' SRL was written in the language of the three different subject areas, mathematics, problem solving or reading comprehension, so students would receive a report relevant for the questionnaire they completed (or more than one report if they completed questionnaires in multiple subject areas) (e.g., Figure 6 shows the mathematics SRL progression).

Similarities between the empirically derived progression levels and the theoretical progression levels postulated by researchers and teachers during the creation of the instrument indicate strong construct face validity.

Mapping students to SRL levels based on their WLE estimates, determined through instrument calibration, was possible as item difficulty and student ability are located on the same scale. Therefore, the logit "cut-point" of each level corresponded to both the point at which the items changed from one level to another and the point at which students were mapped to one level or another.

Rasch item calibration results of students being mapped to the level at which their probability of "correctly" responding to items at that level corresponded to 50%. Thus, their SRL reported level reflected their ZPD, the level at which they were ready to learn SRL behaviours, rather than the students' ZAD (zone of actual development). In this way, the researchers created a formative assessment for SRL rather than an assessment to be used for summative purposes. It was hoped that the teachers would use students' SRL level for instructional purposes, and teachers received PD material on ways they could achieve this.

1. What levels of SRL behaviour do students in Grades 5 to 8 exhibit in Victorian classrooms?

Most Grade 5 to 8 students were located at Levels D, E or F, with very few students at the lower or very upper level on the SRL progression. Students distribution was Level A (2%), Level B (3%), Level C (8%), Level D (15%), Levels E (31%), Level F (35%) and Level G (6%) for the cohort of students for whom a level and grade could be determined (N = 3,948). Refer also to Figure 7 for levels per grade.

Progression of self-regulated learning - mathematics

Level G	**Students at this level are self-regulated learners.** Students at this level have internalised strategies to maximise their learning. When they get a maths task in class they set challenging goals for themselves and regulate all aspects of learning to achieve their goals. They make a plan but can reflect on the plan and adapt to ensure the plan is effective. They submit completed maths tasks and do extra to learn more. When they encounter difficult maths tasks they use automated regulation processes so they can be successful. When they become distracted they find ways to refocus. Students at this level value learning in and of itself and understand their own approaches to learning in ways that allow them to take advantage of the learning experience at all times.
Level F	**Students at this level are becoming systematic in selecting strategies that promote self-regulated learning.** Students at this level are able to evaluate internal and external feedback to reflect on their learning. When they are given maths tasks they analyse the maths task to plan the most effective approach. They set high goals for themselves and persist in order to achieve their goals. They know what success looks like and use this image to motivate themselves. If things get difficult they can use self-talk to persist. They can think beyond the requirements of the maths task that is set and use other strategies that have been successful in the past to maximise their learning. If they do not do well on a maths task they reflect on why and think of ways to do better next time. When they are not interested in a maths task they will find ways to make it interesting and do their best to learn. They like to be able to use what they have learnt from outside the class and think that learning is important.
Level E	**Students at this level are beginning to intentionally select strategies to regulate their learning.** Students at this level are beginning to reflect on their learning so they can improve. They enjoy learning when they get to investigate something they don't already know. They plan an approach by using strategies they have developed in the past and can change their plan when they need to. When maths tasks become difficult they use things that have worked in the past. When given a maths task that they initially think they cannot do properly, they seek strategies to help them do their best. They can apply past experiences of success to try hard and persist. If they do not do well on a maths task, they try to work out what they did wrong. Being interested in a maths task is important because it makes them try harder, but even if a maths task is not interesting to them they will try their best. When they are working on maths tasks they incorporate feedback to improve.
Level D	**Students at this level are beginning to develop strategies to regulate their learning.** Students at this level want to learn and believe that, with teacher input, they can do well on maths tasks in class. When given maths tasks, they plan an approach and aim to finish what the teacher has given them. When working on maths tasks, they use strategies like repeating teacher instructions, visualising

	solutions and changing their plan if they are off track. They are motivated by the teacher giving them positive feedback and will elicit feedback from the teacher. They value the teacher's advice and use it to reflect on and improve their work, and they know when they have done well. When they do not do well on a maths task, they try to work out why and what they can do differently because they want to learn as a result of doing the maths task. They enjoy learning new things and believe they have the ability to do well.
Level C	**Students at this level are beginning to monitor their approach to learning**. Students at this level think it is important to do well at school. They become interested in maths task when they think they can learn. When they respond to a maths task, they hand in their best effort. They know when they are getting distracted and they make an effort to ignore distractions. They are motivated by wanting to learn and get all the answers right. They are more comfortable doing maths tasks that they have done before because they know they can do them well. They value the teacher's advice and rely on the teacher to give them feedback. If they do not do well on a maths task, they want to improve next time but attribute their lack of success to someone else, like the teacher. They will, however, put in more effort next time.
Level B	**Students at this level engage in class tasks if they are interested in the task**. Students at this level will do better if they are interested in the maths task. They are motivated by wanting to get correct answers and having peers think they are clever. They focus only on the information provided and do not look beyond the maths task to the bigger picture. They do not reflect or check their work when they have finished. If they do not do well on a maths task it is because they allow themselves to get distracted when the maths task becomes too difficult. While doing difficult maths tasks they can recognise the things they are doing that work for them.
Level A	**Students at this level are teacher directed.** Students at this level need to be guided by the teacher when they are given a maths task to do in class. If they believe the maths task is too hard for them they attempt only the parts they know they can do. They hand in work unfinished or it's finished but not their best effort. Their learning approach is driven by external influences like wanting a good report or wanting to please the teacher. They allow themselves to be distracted when doing maths tasks and rely on other students to model task-focused behaviour for them. Their motivation for doing maths tasks can stem from a desire to save face in front of their peers or to be told by their teacher that they are doing well. They do not elicit feedback but will do what the teacher tells them to do. They enjoy learning when they find maths tasks easy. When they do not do well on a maths task, they do not believe that there is much they can do about it.

Figure 7. Student progression of SRL for mathematics

2. Does the student's SRL level vary depending on grade?

The average student's SRL level distribution was lower for Grade 8 students in comparison to other grade levels (Figure 7). This is reflected by a reduction in the average WLEs calculated by grade (Table 5).

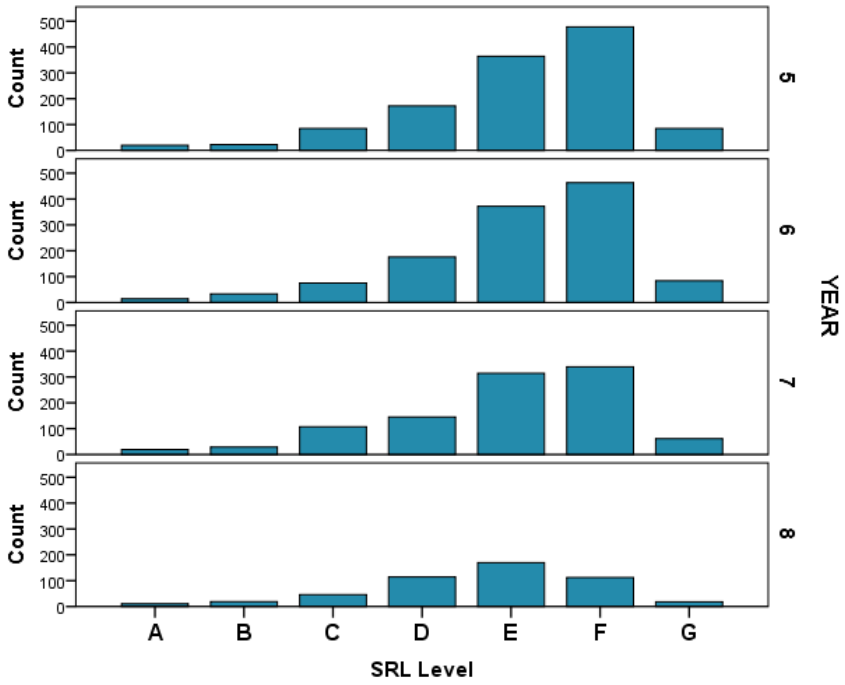


Figure 8. SRL progression level counts per grade/year.

Table 5. Mean SRL use per grade

Grade	Mean	N	Std. Deviation
5	0.722	1227	0.650
6	0.713	1216	0.645
7	0.615*	1014	0.675
8	0.476**	490	0.627
Total	0.660	3947	0.657

**Mean difference between Grades 7 and 5, 6 or 8 are significant (p < 0.002). **Mean difference between Grades 8 and 5, 6 or 8 are significant (p < 0.001). There was no significant difference between Grades 5 and 6.*

Literature suggests that the focus on SRL is reduced in secondary schools (e.g., Dignath & Buttner, 2018; Panadero, 2017); therefore, the finding that secondary students exhibit lower SRL behaviours than primary school students indicates evidence towards criterion validity of the assessment.

To examine the possibility of DIF between the student samples in the different grades involved in this study (which could cause differences in the mean student estimates), data was calibrated separately for

each grade, and item parameter estimates were compared. The correlation between item parameter estimates for each grade was used as an indication of the amount of DIF between grades. Item difficulties per grade were compared and correlations (r) are shown in Table 6. All correlations were significant (2-tailed, Sig. 0.01) and greater than 0.9, demonstrating no major differences in the way the indicators were measuring SRL in the different grades.

Table 6. Grade Item parameter correlations (r)

Grade	5	6	7	8
5		0.979*	0.952*	0.905*
6	0.979*		0.976*	0.943*
7	0.952*	0.976*		0.972*
8	0.905*	0.943*	0.972*	

** Correlation significant at the 0.01 level (2-tailed)*

To examine possible differences in the functioning of the SRL assessment across grade levels, instrument statistics were compared for each cohort (Table 7). No differences were noted in either the reliability of the assessment in measuring SRL for particular grade levels nor in the mean standard error of person ability measures, mean fit statistics or standard deviations of the mean fit statistics. Reliability estimates for indicator and student separation were identified using ConQuest (Adams, Wu, & Wilson (2012). Fit statistics were estimated as residual-based indices as described by Wu (1997), who extended those described by Wright and Masters (1982). Weighted fit is the mean-squared difference between the observed and the estimated difficulty of each score, weighted by the variance of the assigned score, referred to as INFIT (information-weighted mean-squared residual goodness of fit statistic). INFIT means and standard deviations for each grade cohort are listed in Table 7.

Table 7. Test statistics per grade

Grade	5	6	7	8
Reliability	0.870	0.873	0.875	0.867
Mean Std. Error	0.042	0.045	0.046	0.062
MNSQ INFIT	0.987	0.987	0.989	0.994
Std. Dev. Fit	0.133	0.119	0.127	0.123

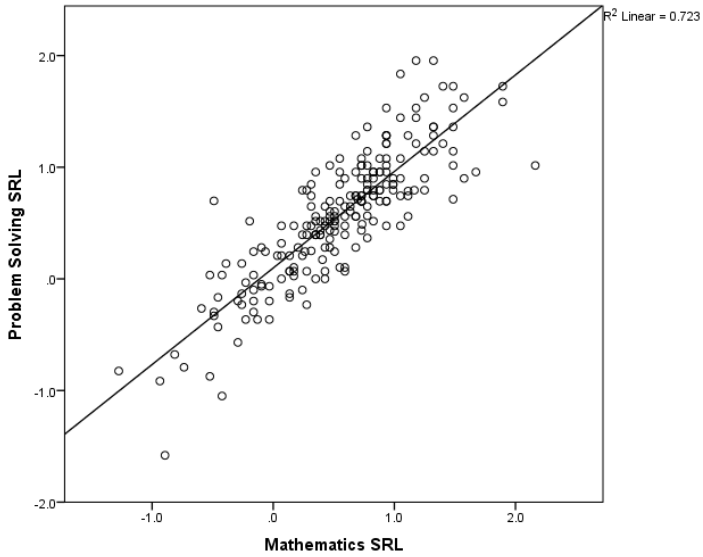
3. Does the student's SRL level differ depending on the subject domain?

Although the order of item difficulty remains stable across the three subject versions of the student questionnaire (Figure 5), this does not provide evidence that each student uses the same level of SRL behaviour in different subjects. Some students completed SRL questionnaires in more than one subject domain; therefore, it was possible to compare student SRL estimates in one subject with another (Figure 8). This is a separate analysis from comparing item difficulty (Figure 5) as the question is now about individual student differences in their use of SRL behaviours for each subject.

There was a substantial relationship between students' SRL behaviour estimates between subjects; the strongest relationship was between problem solving and mathematics SRL behaviour ($R^2 = 0.723$), and the weakest between reading comprehension and problem solving SRL ($R^2 = 0.682$), although the difference in strength is minimal (Figure 8). While the relationships between students' measures on different subject versions indicate strong evidence for convergent validity, there were student differences in the application of SRL behaviours in different subject areas depending on personal preferences (as predicted), indicating a discriminant validity quality of the assessment. It was expected that there would be a general relationship between students' SRL behaviours in different subject areas (convergent validity), but that there would be reasons why some students performed better in various subject areas (Figure 8).

Some students were measured to have a large discrepancy between measures based on subjects, with differences up to 2 logits. Other students had much the same level of SRL behaviour in each of the subject areas tested (Figure 8).

A



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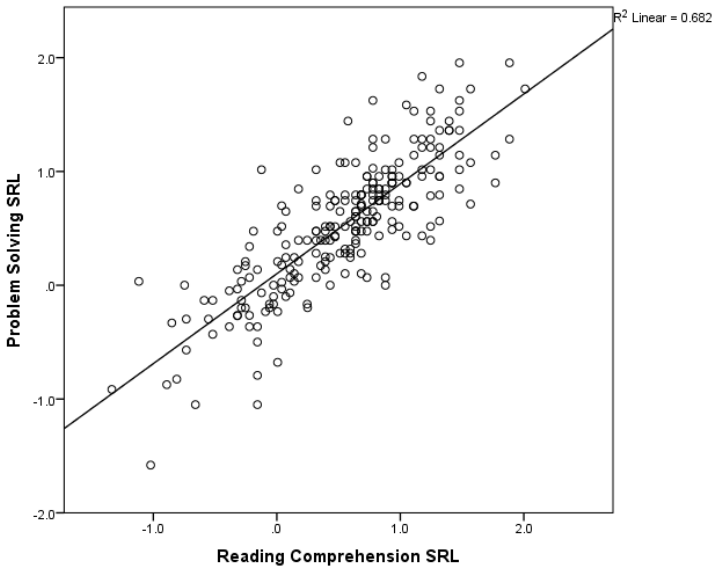

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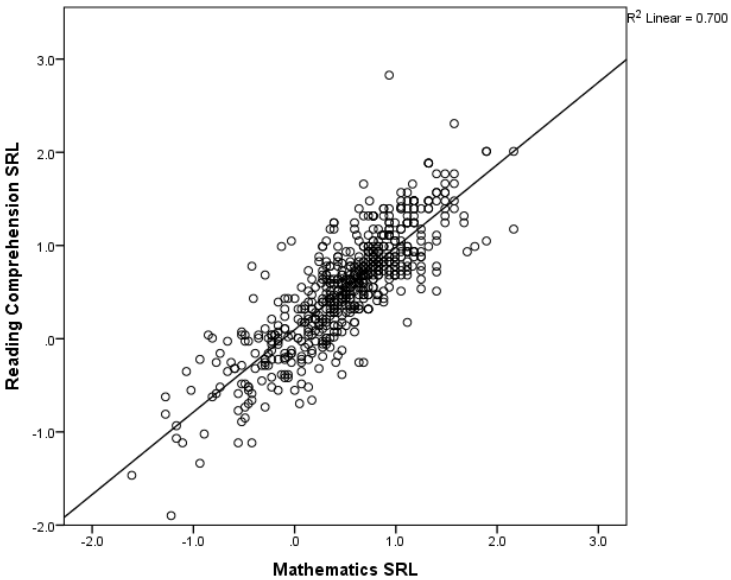

Figure 9. Student ability estimate comparisons between subject area questionnaire formats: (A) problem solving vs mathematics, (B) problem solving vs reading comprehension and (C) mathematics vs. reading comprehension.

4. Is there a relationship between SRL and student achievement in mathematics or reading comprehension?

To investigate the relationship between SRL and content ability across multiple grade levels, it was imperative that students' skills in each of these areas were mapped using a common assessment approach. Therefore, classroom tests were not considered appropriate, and to gather the rich data required to compare student ability, end-of-year reports were inadequate and not directly comparable across schools. An appropriately designed assessment system was provided by the Assessment Research Centre at the University of Melbourne (Australia) and described in Griffin (2014). The subject area "problem solving" is not included in this section, as participation rates were lower (n = 235 for the problem-solving SRL measurement) compared with mathematics and reading comprehension (refer to Table 8).

Predictions of increased ability by grade were as expected, as presented in Table 8, supporting the validity of the content assessments as a method of reference to compare student SRL behaviours with academic competence.

Table 8. Mean content ability per grade

	Mathematics				**Reading Comprehension**			
Grade	Mean	N	Std. Dev	Mean Diff	Mean	N	Std. Dev	Mean Diff
5	2.371	622	0.938		1.880	281	0.773	
6	2.738	681	0.959	+ 0.367***	2.134	380	0.744	+ 0.255***
7	2.993	374	0.995	+ 0.623***	2.308	444	0.812	+ 0.429***
8	3.592	296	0.992	+ 1.222***	2.722	106	0.686	+ 0.843***
Total	2.799	1973	1.043		2.190	1211	0.805	

*Note: "Mean diff" indicates the difference between the mean grade ability estimate and that of the preceding grade; ***p = 0.000.*

Simple linear regressions were utilised to determine whether SRL behaviour predicted academic performance for mathematics or reading comprehension. A significant regression equation was found for both mathematics: $F(1, 1971) = 51.48$, $p = 0.000$; reading comprehension: $F(1, 1209) = 31.046$, $p = 0.000$. R^2 was 0.025 for both content areas. Students' predicted mathematics ability was 2.627 + 0.260 (SRL) and students' predicted reading comprehension ability was 2.067 + 0.190 (SRL); all units are in logits. Students'

academic performance was therefore increased by 0.190 to 0.260 logits for every logit of SRL use. The effect size r was low for both subjects: 0.160 for mathematics and 0.158 for reading comprehension.

Separate regression analyses per grade were performed to determine whether the predictive effect of SRL on academic performance was consistent between grade levels (Table 9). For every year level increase, the predictive power of SRL on achievement also increased. Further, SRL had a greater predictive power on mathematics ability than on reading comprehension ability based on the academic performance measures used in this study (ARCOTS). Importantly, however, the assessment systems were scaled separately for mathematics and for reading comprehension; therefore, it is likely that results are not directly comparable.

Table 9. Linear regression results: Prediction of academic performance based on SRL

	Mathematics					**Reading Comprehension**				
Grade	**R^2**	**r**	**p**	**B**	**+ SRL**	**R^2**	**r**	**p**	**B**	**+ SRL**
5	0.041	0.201	0.000	2.163	0.291	0.020	0.142	0.018	1.765	0.167
6	0.040	0.201	0.000	2.521	0.303	0.033	0.143	0.000	1.992	0.211
7	0.064	0.253	0.000	2.759	0.386	0.039	0.197	0.000	2.166	0.233
8	0.088	0.297	0.000	3.346	0.504	0.045	0.212	0.029	2.605	0.202

In summary, there is a positive relationship between students' SRL behaviours and their academic performance, although the relationship is not particularly strong. This is likely due to the vast number of other factors that contribute to an overall student ability estimate/competency level on a mathematics or reading comprehension assessment, including teacher, school, parent and socio-economic factors.

Teaching SRL Practices

The teacher classroom practices related to the SRL assessment tool produced an alpha reliability (EAP/PV) of 0.76, respectively, indicating internal consistency and evidence for construct validity. The reliability for the teacher instrument was lower than the students' due to lower teacher sample numbers and possible difficulties in teachers accurately self-reporting their own practices.

For estimation of parameters, average indicator difficulty was arbitrarily set to zero, while teacher ability estimates were allowed to vary. The range of latent student ability estimates was compared to the range of indicator difficulties to check that the items were appropriately matched to teachers' level of practice. Item and person separation reliabilities were 0.88 and 0.75, respectively, for teachers. This indicates that the items' facility to map SRL was appropriate over a large range of abilities tested. The mean of the latent

ability distribution was 0.71 logits (standard error 0.063), showing that the indicators were matched for teachers' practices. Item analysis supported the notion that the items fit the Rasch model and average item-rest correlation was 0.36 (range: 0.15–0.51).

5. What levels of SRL classroom practices do teachers exhibit in Victorian classrooms?

Step item difficulty estimates (thresholds) were transformed into written descriptions of skill levels to form a progression of teachers' SRL classroom practices, using the same method as that for the students (Figure 9). Clusters of items were identified based on their being a logical substantive meaning behind the practices, which grouped at successive levels of increasing difficulty. Using this method, five levels defining perceptible increasing levels of SRL instruction were identified. Similarities between the empirically derived progression levels for teachers' practices and students' SRL behaviours indicate strong construct face validity of both measures.

The majority (44.4%) of teachers were located at Level C on the SRL classroom practices progression. Teachers were provided a report based on their SRL classroom practices level. When asked, "Do you think the 'Progression of teaching SRL skills – classroom practices' reflects your experience of classroom practices?" 80% of teachers responded "yes", while 15% responded "no" (5% declined to answer). Considering only 7% of teachers were reported to be located at the top level (Level E) on the progression, these responses provide strong support for the validity of the assessment.

Progression of teaching self-regulated learning skills – classroom practices

Level E	**Teachers are explicitly and intentionally teaching students to be self-regulated learners. Students are taught how to draw from their expanding repertoire of skills to independently plan their learning, adapt and create strategies, and use evaluation of performance to improve learning.** At this level, teachers make explicit the link between independent planning and evaluation of performance with increased self-regulation. Teachers provide opportunities for students to independently review their plans according to their progress. Students are taught how to adapt known strategies or create new strategies when they are learning. Teachers encourage students to evaluate different ways of working so they can apply the best process in the future. Students are taught how to use feedback effectively to improve learning. Students are taught that they can create their own motivation by believing in themselves and that this improves learning and performance.
Level D	**Teachers assist students to evaluate strategies and different approaches to learning to build a repertoire of skills and techniques that can be drawn upon in various learning situations.** At this level, teachers help students understand that the types of goals they set impact their achievement. Teachers help students to reflect on the strategies and behaviours that led to their

	performance on a given task. Students are encouraged to try different ways to achieve the desired outcome and to visualise processes for achieving a solution. Teachers promote the use of independent self-instruction techniques, such as self-talk, as a method for guiding their learning. Students are encouraged to become aware of distractions and develop techniques to help them stay on task.
Level C	**Teachers guide students to differentiate behaviours and motivation that affect learning and to select strategies for improving performance and focus.** At this level, students are taught to value the connection between setting goals and achievement, including setting goals that develop mastery of specific skills. Students are taught how to record strategies and use previous learning experiences to improve current learning. Students are guided to identify strategies and behaviours that improve learning. Motivation is increased by harnessing existing interest in a topic. Students are encouraged to value and draw satisfaction from the process and outcome of learning. Teachers and students engage in discussions about the consequences of adaptive and defensive behaviour and how to avoid dissatisfaction. Teachers assist students to draw on proven strategies to help them focus.
Level B	**Teachers support students to select appropriate behaviours and learning strategies and together they link these to performance and achievement.** At this level, teachers work with students to set their own goals based on what they know they can do and what will improve their skills. Teachers instruct students to use previous achievements to set goals. When planning, teachers instruct students on how to select strategies that will attain the intended outcome. Teachers believe that student self-satisfaction affects their behaviour. Teachers support students to picture a quality outcome, use speak aloud strategies and prior experiences to complete tasks. Students are taught to use feedback to evaluate their performance. When students find tasks difficult, teachers reiterate the links between effort, persistence, and level of achievement.
Level A	**Teachers direct student learning, including goal setting, behaviour, learning strategies, and attention.** At this level, teachers set goals for their students and students are told to work hard to achieve good grades. Teachers suggest that students make a general plan when they begin tasks. Teachers encourage students to think about learning in terms of the content presented. Teachers suggest that there may be more than one way to achieve the desired outcome of a task. Teachers guide students to reflect on what they want to achieve. Students are given feedback about what they have done right or wrong and are taught to rely on teachers or parents to inform them of their performance. When teachers notice that students lack focus, they tell students to concentrate.

Figure 10. Teacher progression of classroom practices related to SRL.

6. Does the teacher's SRL level vary depending on school type (primary or secondary)?

Secondary teachers were located lower on the progression on average, compared with primary teachers, a finding that reflects the reduced SRL behaviour in secondary school students. No secondary school teachers were located at the top level of the SRL classroom practices progression, and no primary teachers were located at the lower level (Table 10).

Table 10. Teacher classroom practices in SRL progression levels

		Grade					
		5/6	**5**	**6**	**7**	**8**	**Total**
Teacher Level SRL Classroom Practices	Level A	-	-	-	3.3%	4.3%	1.6%
	Level B	15.0%	13.8%	9.1%	26.7%	30.4%	19.4%
	Level C	55.0%	44.8%	50.0%	36.7%	39.1%	44.4%
	Level D	25.0%	31.0%	31.8%	30.0%	26.1%	29.0%
	Level E	5.0%	10.3%	9.1%	3.3%	-	5.6%
Total		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
No. Teachers		20	29	22	30	23	124

Teachers were divided into primary or secondary school categories and an independent samples *t* test was conducted to compare the teacher WLE estimates for classroom practices between school types. There was a significant difference in the WLEs for primary (mean: 0.824; std. dev: 0.513) and secondary (mean: 0.500; std. dev: 0.636) school teachers; $t(122) = 3.141$, $p = 0.002$.

As the secondary teachers were found to be using less explicit teaching methods to foster SRL behaviour among students compared to primary teachers, and the Grade 8 students were found to be using fewer SRL behaviours than the Grade 7 students, a further analysis to determine if there were any significant differences between the specific grade levels was undertaken. A one-way between subjects' analysis of variance (ANOVA) was conducted to compare the effect of teachers' grade (5/6, 5, 6, 7 or 8) on their SRL classroom practices. There was a significant difference between teachers' WLEs: $t(4) = 3.01$, $p = 0.21$. Post-hoc Tukey honestly significant difference (HSD) tests indicate that the Grade 8 teachers use significantly lower SRL classroom practices compared with Grade 5 teachers (Table 11).

Table 11. Mean differences between teachers' classroom practices per grade.

Teachers' Grade	Mean	Std. Dev	5/6	5	6	7
5/6	0.69	0.44				
5	0.87	0.48	+ 0.17^{NS}			
6	0.89	0.61	+ 0.19^{NS}	+ 0.02^{NS}		
7	0.56	0.61	- 0.13^{NS}	- 0.31^{NS}	- 0.34^{NS}	
8	0.42	0.67	- 0.27^{NS}	- 0.44*	- 0.47^{NS}	- 013^{NS}

*Note: Reference categories for mean differences in left-hand column *p < 0.05.*

7. What are Victorian teachers' views on planning for and teaching SRL?

In addition to the SRL classroom practices questionnaire, teachers were asked a variety of questions about their point of view regarding the importance of SRL in relation to academic success, their planning and teaching of SRL in the classroom context and the challenges that they might face when planning or teaching SRL. Some teachers did not respond to particular questions, and for some questions, multiple responses could be selected; therefore, percentages do not always add up to 100%. Frequencies of responses are summarised below.

Academic success

- In relation to the importance of SRL, 99% of teachers reported that they thought a student's ability to self-regulate their learning would impact their academic success (1% said they did not; 10% did not respond); n = 92.
- A total of 86% of teachers reported that they thought students with higher competence in SRL showed greater progress than students who had lower competence in SRL (4% did not agree; 10% did not respond); n = 92.

Planning for teaching SRL

- When asked about planning for SRL, 46% reported that it is important to plan for teaching SRL, 38% reported that they specifically included elements of SRL when planning reading, mathematics or problem-solving lessons and 13% of teachers reported that SRL is included during team planning at their schools. Teachers were able to select multiple responses for this question.
- When teachers were asked to "Consider how you incorporate SRL when planning for lessons. Select the practices that best describe your planning methods"; n = 67:
    - 33% responded, "I plan for SRL in student groups according to the group's level of SRL"

- 31% responded, “I plan for SRL as a whole class”
- 24% responded, “I referred to the progression of teaching SRL skills – classroom practices when planning for my classroom”
- 13% responded, “I plan for SRL using individual student plans”
- 6% responded, “I include a plan for assessing SRL”
- 28% responded, “I do not formally incorporate SRL when planning lessons”

Student SRL progression

- Teachers were asked whether they shared the individual levels of the progression of student SRL with students, and 58% of teachers reported that they did not, while only 28% reported they did (14% did not respond); n = 67.
- Similarly, 55% of teachers reported that they did not discuss the progression of SRL in their lessons with the students, while 31% said they did (the same 14% as the previous question did not respond); n = 67.
- When teachers were asked, “Do you feel confident that you can identify levels of SRL skills in your students?” 62% of teachers responded “yes” while 28% responded “no”. This question was administered before the student SRL progression was available for teachers; n = 92.

Teaching SRL in the classroom

Teachers were asked to comment on the level of confidence they felt in implementing SRL as part of their classroom practices; 51% responded that they were “confident” or “very confident”; 43% responded “beginner or not confident”; 24 % responded that their confidence increases as their experience with teaching SRL increases; n = 37.

In summary, while almost all teachers believed that students’ SRL skills were important for their academic success and progress, fewer than a third formally planned for incorporating SRL into their lessons and almost half were not confident in implementing SRL as part of their practices. This indicates a further need for PD for current teachers on SRL instruction. A quarter of teachers reported that their confidence in teaching SRL improves as their experience with teaching SRL increases, suggesting that teachers could benefit from more practical examples of how to incorporate SRL practices into their classroom teaching.

8. Which challenges do Victorian teachers experience when planning for, teaching or assessing SRL?

Teachers were asked what might be impeding their teaching SRL skills to students in their classrooms; n = 92:

- 37% responded that there was nothing impeding their teaching of SRL skills to their students.
- 47% responded, “There is not enough time to teach the content of the curriculum as well as SRL skills”.

- 23% responded, “I don’t know how to teach SRL skills”.
- 8% responded, “I don’t think that all teachers are responsible for teaching SRL skills”.
- 8% responded, “I don’t have the school support to teach these kinds of skills”.
- 1% responded, “I don’t think they should be taught in schools”.
- 1% responded, “I don’t think they are as important as teaching the content of the subject”

Teachers were also asked, “What specific challenges have you identified to including SRL in your classroom practices?”

- 31% did not identify any specific challenges (no comment or n/a), but only 3% said there were no challenges.
- 37% identified challenges related to students: difficult behaviour, student attitudes, readiness to learn SRL skills.
- 18% referenced time-related limitations.
- 13% referenced lack in ability to teach SRL.
- 10% found it difficult to include SRL along with other planning.
- 9% referenced assessing student levels of SRL.
- 3% reported finding a balance between teaching “curriculum” and SRL skills was a problem.

When asked, “What specific challenges have you identified in assessing SRL in your classroom practices?”

- 31% responded with no comment or n/a, while 1% responded there were no challenges.
- 24% of teachers responded that time was the biggest challenge.
- 22% referenced resources including teacher ability.
- 15% of teachers said that the range of student ability was too wide (including special needs and high capacity students).
- 13% referenced “lack of student engagement and challenging behaviour”.

The main challenges that teachers identified in incorporating SRL instruction into their practices were not enough time, not enough teaching resources or teacher expertise, student behaviour, student attitude and student readiness to learn.

Conclusions

Assessment of students based on their use of SRL revealed that the order of progression of SRL was maintained across various subject areas tested: mathematics, reading comprehension and problem solving ($R^2 \approx 0.96$). Students did not always act with the same level of SRL in each subject area ($R^2 \approx 0.77$) with some differences in their use of skills depending on the subject. This was expected as students have personal motivations and differences in the subjects they prefer.

Students were on average using high quality SRL behaviours in class and ready to learn quite specialised approaches to learning. This was evidenced by the students' level on the "progression of SRL".
Few students were located at the lower levels of the progression (Level A: 2%; Level B: 3%), but more focus should be placed on these students as they are at risk of losing engagement with the learning process in class.

Students' level on the SRL progression was reduced as their grade increased (Table 6), with Grade 8 students performing significantly lower than Grade 7 students, and Grade 7 students performing significantly lower that Grades 5 and 6 students (who were equivalent in their use of SRL practices). This indicates a need for increased focus on and teaching of SRL in secondary schools. There are many possible reasons that could account for secondary students reporting less quality SRL behaviours, some of which include schooling structure, curriculum or teaching differences between primary and secondary schools.

Students utilising higher quality SRL behaviours were more likely to perform well on the content tests in the subject areas mathematics or reading comprehension. Although the relationship is considered "weak" according to statistical standards, this is likely due to the vast number of other factors that contribute to an overall student ability estimate/competency level on a mathematics or reading comprehension assessment, including teacher, school, parent and socio-economic factors. The relationship between SRL use and performance on the subject-based tests was strongest at the Grade 8 level; this implies that focusing on increasing SRL use in secondary schools may be of particular importance.

Teachers utilised some quality classroom practices on SRL in their classrooms; however, the secondary teachers reported less explicit teaching of SRL (Table 11) consistent with the student results. The parallels between the findings based on students' use of SRL behaviours and teachers' use of SRL practices indicates (1) empirical support for the validation of both measures, (2) teachers' focus on SRL has implications for students' use of SRL behaviours and (3) teaching of SRL in secondary schools should be improved.

While teachers readily acknowledge the importance of student SRL behaviours (almost all teachers believed that students' SRL skills were important for their academic success and progress), fewer than a

third formally planned for incorporating SRL into their lessons and almost half were not confident in implementing SRL as part of their practices. A quarter of teachers reported that their confidence in teaching SRL improves as their experience with teaching SRL increases, suggesting that teachers could benefit from more practical examples of how to incorporate SRL practices into their classroom teaching.

Teachers face various challenges in supporting students' SRL in their classrooms: not enough time, not enough teaching resources or teacher expertise, student behaviour problems, student attitude and student readiness to learn. This indicates a further need for PD for current teachers on SRL instruction, especially in early secondary schools, where both levels of teaching SRL practices and levels of students' use of SRL behaviours are lower.

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