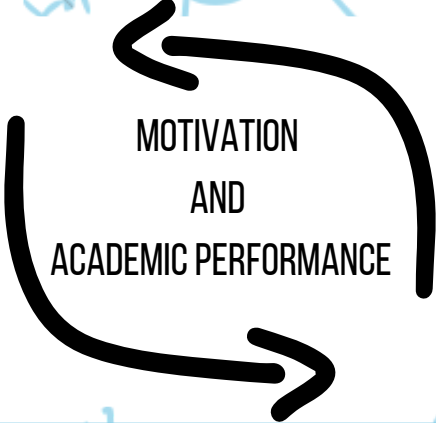


TARGETING MOTIVATION FOR STUDENTS WITH MATHEMATICS DIFFICULTY

WHY?

There is a bi-directional relationship between psychosocial development (e.g., motivation) and academic achievement (Pekrun et al., 2002; Weiner, 1985).

MOTIVATION
AND
ACADEMIC PERFORMANCE



Mathematics Difficulty

- Math knowledge at school entry is one of the strongest predictors of academic achievement (Claessens et al., 2009)
- Many students struggle with mathematics whether they have a formal diagnosis of mathematics disability or not (e.g., Jitendra et al., 2018)
- Low math performance can be in one or many domains of mathematics such as number sense (Andersson, 2008), word-problem solving (Peltier and Vannest, 2017), and fractions (Fuchs et al., 2013).

Motivation

Motivation can be operationalized using Conradi et al.'s (2014) hierarchy of constructs and is categorized using three constructs:

- Goal orientation
- Beliefs
- Disposition

While motivation cannot be easily observed, observable skills such as goal setting have been used to intentionally target and improve student motivation and academic achievement.

Comorbid Mathematics Difficulty and Low Motivation

- Increase in research evaluating the bidirectional relationship between academic achievement and motivation (Toste et al. 2020; Yunus & Ali, 2009)
- Significant positive correlations between effort, self-efficacy, worry, and motivation with academic achievement (Skaalvik et al., 2015; Yunus & Ali 2009).
- The cumulative nature of mathematics makes it more likely that students who struggle with foundational skills in early elementary school will continue to struggle with it throughout schooling (e.g., Morgan et al., 2009).

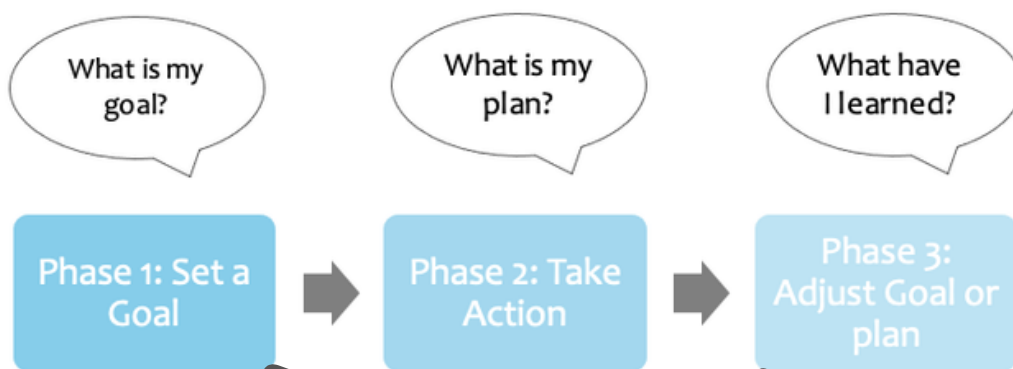
Continued struggle and low self-efficacy might lead to reduced motivation over time for students with persistent mathematics difficulties.

Integrate motivation building into instruction for multi-step mathematics problems to intensify intervention for students with comorbid mathematics difficulties and low motivation



MOTIVATION: GOAL SETTING

The SDLMI is a teaching model implemented by teachers to enable their students to self-direct and self-regulate their actions in pursuit of goals. (Shogren et al., 2019)



Phase 1
Teacher supports student to identify & set a goal

Phase 2
Teacher supports students to:

- develop an action plan to achieve Phase 1 goal
- identify a self-monitoring process

Phase 3
Teacher supports students to:

- evaluate progress toward their goal
- determine if goal achieved
- revise goal if needed

MATH: SOLVE STRATEGY*

- S** Study the problem – Underline & rewrite question in own words
- O** Organize facts – Mark necessary facts & rewrite in own words
- L** Line up a Plan – Write plan with no numbers
- V** Verify plan with action – Create & solve plan-based number sentence
- E** Examine results – Compare answer to question, check work & write answer in a sentence

INTENSIFYING INTERVENTIONS FOR COMORBIDITY

Strength

- Both SDLMI & SOLVE are research-informed practices for improving motivation & multi-step mathematics problem solving
- Effectiveness can be tracked using checklists for academic engagement, continued progress towards goal achievement & mathematics progress monitoring



Dosage

- Small group math instruction & one-on-one goal-setting provide ample opportunities for student response & feedback
- Dosage or frequency of math intervention sessions can be increased
- Teacher support for SDLMI can become less frequent as student becomes better at monitoring progress and goal-setting



Alignment

- Write goals related to multi-step math problem solving
- Can be aimed at improving overall accuracy, frequency of independent math practice or correctly implementing SOLVE
- Goals can be aligned to individual students' desired math intervention outcomes & motivation level



Attention to Transfer

SDLMI intentionally targets transfer of the skills to other contexts and environments. Students develop and monitor goals for math problem solving but can extend to other academic & functional outcomes (e.g., reading, social initiation)



Comprehensiveness

- SDLMI is an established evidence-base practice for improving in-school & post-school outcomes for students with learning difficulties
- SOLVE can be explicitly modeled by the teacher & implemented with teacher support based on student needs
- Support can be reduced as math performance & goal-setting improve



Academic & Behavioral Supports

- Set goals appropriate to the student's math level & after considering behavioral factors that might limit follow-through with goals (e.g., inattention, anxiety, incidence of challenging behaviors)
- Reward implementation of SDLMI instead of rewarding goal achievement to promote healthy goal-setting & progress monitoring



Individualization

- Teachers can facilitate the use of data to help students make decisions (i.e., continue the goal, make adjustments to their plan or goal, or begin a new goal). Seeing their own data is a better motivator than class-wide progress.
- SDLMI & math instruction can be easily adapted for individualization



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