Effects of formative assessments to develop self-regulation among sixth grade students: Results from a randomized controlled intervention

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Kelly D. Meusen-Beekman[a,d,*], Desirée Joosten-ten Brinke[b,c], Henny P.A. Boshuizen[b,e]

[a] HZ University of Applied Sciences, The Netherlands
[b] Open University, The Netherlands
[c] Fontys University of Applied Sciences, The Netherlands
[d] Roosevelt Centre for Excellence in Education, The Netherlands
[e] University of Turku, Finland

A B S T R A C T

This article presents the results of a formative assessment intervention in writing assignments in sixth grade. We examined whether the formative assessments (i.e. peer and self-assessment) would improve self-regulation, motivation and self-efficacy among sixth graders, and whether differential effects exist between formative assessment forms. The study lasted for 27 weeks. Participants (N = 695) were exposed to one of three conditions: peer assessment intervention, self-assessment intervention, or a control condition. The interventions were delivered in a whole-classroom format. The results of a multilevel analysis showed that the use of formative assessment to develop self-regulation among students was effective for both intervention groups. Also, motivation was affected in both intervention groups. Finally, no significant differences were found between the peer assessment intervention and the self-assessment intervention concerning self-regulation, motivation, or self-efficacy. The implications of these results are discussed.

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1. Introduction

Over the years, the importance of self-regulation has been recognized in education. It has been incorporated in academic intervention programs to help students learn specific academic and study skills (Cleary & Chen, 2009). There are multiple conceptualizations of self-regulation. Boekaerts and Simons (1998) define self-regulation as the internally directed capacity to regulate affect, attention, and behavior to respond effectively to both internal and environmental demands. The process of self-regulated learning is described by Pintrich (1999) as "an active, constructive process whereby learners set goals for their learning and attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and contextual features in the environment" (p. 463).

Although teachers in primary education have become increasingly aware of the importance of students being able to monitor their actions, to set and reach goals, and to self-regulate their learning (De Boer, Donker-Bergstra, & Kostons, 2013), pupils often appear to lack the essential strategies for self-regulation (Cromley, Snyder-Hogan, & Luciw-Dubas, 2010). Thus, the main concern is how to enhance students' repertoire of learning strategies and enable them to select, implement, and evaluate their effectiveness over the course of primary school.

De Boer et al. (2013) emphasize strategy instruction in primary education in order to develop effective learning strategies which empowers pupils to become successful learners, and which makes them better prepared for the demands of secondary and, eventually, higher education. Formative assessment can set the stage for the development of self-regulated learning strategies among primary school students. Formative assessment can be defined as "the process of seeking and interpreting evidence, for use by learners and their teacher, to decide where learners are in their learning, where they need to go, and how best to get there" (Broadfoot et al., 2002). This implicates that the purpose of formative assessment is to monitor the progress of the learner

* Corresponding author at: HZ University of Applied Sciences, Department of Primary School Teacher Trainers, Edisonweg 4, 4382 NW, Vlissingen, The Netherlands.
E-mail address: Kelly.meusen@hz.nl (K.D. Meusen-Beekman).

toward a desired goal, seeking to close the gap between a learner's current status and the desired outcome (Clark, 2012). Formative assessment is assessment conducted during instruction in order to give teachers and students a clear idea of how students' performance levels compare with the teaching targets (learning goals or objectives), and how they might close the gap between their current level of understanding and the target (Brookhart, Moss, & Long, 2010).

Research shows that formative assessments have positive effects on students' learning and achievements (Black & Wiliam, 2003). Formative assessment can be related to self-regulated learning (Black & Wiliam, 2009; Clark, 2012; Nicol & MacFarlane-Dick, 2006). According to Black and Wiliam (1998), effective formative assessment consists of five key strategies: (1) clarifying, sharing, and understanding learning intentions and success criteria, (2) engineering effective classroom discussions, (3) providing feedback, (4) activating learners as instructional resources for each other and (5) activating learners as owners of their own learning.

Although there is an awareness of the importance of self-regulation in primary education and a relation between self-regulation and formative assessments, less is known about the effectiveness of formative assessment on the development of self-regulation in upper primary education. Both peer assessment and self-assessment include all five key strategies. The present study aims to empirically examine whether these to formats of formative assessment can enhance self-regulation among sixth graders, and which assessment form would be most effective for doing so.

1.1. Formative assessment as strategies for developing self-regulation in writing

Self-regulated learning is a complex process. Self-regulated learners apply self-observation, self-judgement, and self-reflection, and adopt self-regulation skills such as goal setting, planning, knowledge activation, metacognitive monitoring, regulation, and reflection (Azevedo, 2009; Bembenutty, 2009; Zimmerman, 2008). Self-regulation refers to the student-initiated regulation of strategies and activities. Self-regulated learners are pro-active learners who combine self-regulation processes with task strategies (e.g., strategic planning, study, organizational strategies) and self-motivational beliefs (e.g., intrinsic motivation, self-efficacy) (Cleary & Zimmerman, 2004). Feedback from previous performances is used to make adjustments for future learning efforts and attempts (Zimmerman, 2000). Effective feedback describes student work against clear criteria and focuses students on specific strategies for improvement (Brookhart et al., 2010). It involves the student in formative assessment, especially as a catalyst for self-regulation (Hattie & Timperley, 2007). Formative feedback needs to address the task or learning processes and provide information on what is understood, and what is aimed to be understood (Sadler, 1998). The setting of criteria by both the teacher and the students is an important strategy for understanding and improving the development of the students' learning (Black & Wiliam, 2009). By developing and improving their self-regulation skills, students become less dependent on external regulation (Nicol & MacFarlane-Dick, 2006), i.e. less dependent on a teacher or other external sources to regulate and control learning processes. Pintrich (2000) provides several requirements for the development of self-regulation: a) learners should be active constructive participants in the learning process, b) they potentially 'monitor, control, and regulate certain aspects of their own cognition, motivation, and behaviour as well as some features of their environment' (p. 454), and c) they learn how comparisons can be made against types of criteria or standards in order to assess whether the process should continue or adapted.

Self-efficacy and motivation are part of the self-regulation process (Shea & Bidjerano, 2010). According to Bandura (1997) self-efficacy is a subjective judgement of one's level of competence in executing certain behaviours or achieving certain outcomes in the future. Self-efficacy requires a degree of self-analysis and reflection (Shea & Bidjerano, 2010). Learners must analyse and reflect on the complexity of a specific learning task and are expected to make judgements about the degree to which their capability matches the demands of a learning task. Self-efficacy and self-regulation seem to mutually reinforce each other (Pajares & Valiante, 1999). Self-efficacy seems to have a direct effect on self-regulation and intrinsic motivation, affecting students' task interest, task persistence, and usage of self-regulatory processes (Schunk & Usher, 2011). Otherwise, if positively affected, self-regulation improves self-efficacy (Alonso-Tapia & Panadero, 2010; Efklides, 2011).

An additional line of evidence points to a positive relationship between self-regulation, self-efficacy and various motivational constructs (Bembenutty, 2009). Motivation influences the intention and perseverance of learning behavior (Dignath & Buttner, 2008). According to Bembenutty (2009) highly self-regulated learners with high self-efficacy beliefs, and intrinsic interest in the task reported a proactive approach to learning and positive relations to goal setting and performances. As a result, students in higher education who are trained in self-regulation might attain higher levels of motivation and academic achievement (Cleary & Zimmerman, 2004).

Although self-regulation skills can be learned at various ages, approaches to develop students' self-regulation in primary school should be different from approaches for older students (Dignath, Buttner, & Langfeldt, 2008). At the start of primary education, children do not often reflect and control their learning (Paris & Newman, 1990). Research shows that self-regulation strategies extend during their elementary school years if children are trained in using and developing them (Veenman, Wilhelm, & Beishuizen, 2004). According to Dignath and Buttner (2008), students in primary education should be supported and trained specifically for building a strategy repertoire. When students are given frequent opportunities to adapt and utilize strategies, and to gain experience in using them, their strategic behavior changes positively in both quantitative and qualitative ways. Strategy instruction based on social-cognitive theory seems to have the largest effect on pupils' academic performance throughout primary education (Dignath & Buttner, 2008). An intervention in primary education based on monitoring and evaluating combined with planning, metacognitive reflection, and motivational support seems to attain the greatest effects on self-regulation (Dignath & Buttner, 2008; Dignath et al., 2008; Vandevelde, Van Keer, & de Wever, 2011).

Formative assessment seems to help learners to improve their self-regulated learning skills (Andrade & Brookhart, 2014; Nicol & MacFarlane, 2006; Sluijsmans, Joosten-ten Brinke, & Van der Vleuten, 2013), particularly when it is integrated into teaching and learning activities (Allal, 2010). Formative assessment supports learning when the results provide information about more than "the presence of a gap between current and desired performance" (Wiliam, 2011, p. 4). If learners are to acquire self-regulation skills by means of formative assessment, instructional practices must be consistent with the theoretical framework of formative assessment. Learners need information about what kinds of activities and learning will most likely result in improving their performance (Andrade & Brookhart, 2014). Formative assessment demands a student-centered instructional approach in which students' progress and performance coincide (Stiggins, 2005). As a result, it can help to improve students' performance and enable students to take responsibility for their learning (Black & Wiliam, 2009).