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Metacognition in the classroom: The association between students' exam predictions and their desired grades

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ABSTRACT

Students are overconfident when making grade predictions, and worse, the lowest-performing students are generally the most overconfident. Because metacognitive accuracy is associated with academic performance, multiple studies have attempted to improve metacognitive accuracy with mixed results. However, these studies may be of limited use because we do not understand the types of information university students use to make performance predictions. The current studies examined the possibility that university students' predictions are associated with their desires—the grade they want to receive. Studies 1–4 demonstrated that students' desired grades were strongly associated with their grade predictions across different courses, universities, and measurement strategies. Study 4 also showed that, if warned about the previous results, students could reduce their reliance on their desired grades and improve the accuracy of their predictions relative to control. Together, results demonstrated that students' exam predictions are associated with their desired grades.

1. Introduction

Ideally, people would accurately assess what information they know, and what information they don't know—they would have accurate metacognition. Metacognition is defined as knowledge and awareness of one's own cognitive processes, and the assessment of these cognitive processes is called metacognitive monitoring (Dunlosky, Serra, & Baker, 2007). Metacognitive monitoring is key to learning and indispensable in a classroom setting because it allows students to assess the impact of their study habits and guide future academic behaviors (Costabile, Cornoldi, De Beni, Manfredi, & Figliuzzi, 2013; Dunlosky & Metcalfe, 2009; Dunlosky et al., 2007; Karpicke, 2009; Karpicke, Butler, & Roediger, 2009). Yet, we do not fully understand the information that students use in the classroom to assess their learning and make grade predictions. The current studies examined one potentially important source of information that students might use to make performance predictions – their desired grades. Further, we examined the effectiveness of an intervention designed to reduce students' reliance on their desired grades when making grade predictions, with the goal of improving metacognitive accuracy. All studies involved university students, of about the same age (see Schneider, 2008, for a review of metacognition and knowledge monitoring in children).

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1.1. Metacognition in the classroom

Anecdotally, university students often report being surprised at how poorly they performed on an exam. Research corroborates this anecdotal evidence and shows that when students predict their exam performance, they tend to be overconfident: they predict that they will earn a higher grade than they do. Further, this effect is moderated by test performance. It is the low-performing students who consistently overpredict their performance, whereas the high performers, though more accurate, tend to slightly underpredict their performance. These results are consistent and generalizable as they are obtained in both classroom studies (Bol, Hacker, O'Shea, & Allen 2005; Foster, Was, Dunlosky, & Isaacson, 2016; Hacker, Bol, & Bahbahani, 2008; Miller & Geraci, 2011a, 2011b; Nietfeld, Cao, & Osborne, 2005) and in laboratory studies (Dunlosky & Rawson, 2012; Hartwig & Dunlosky, 2014; Kelemen, Winningham, & Weaver, 2007; Kruger & Dunning, 1999; Miller & Geraci, 2014, 2016; Rawson, O'Neil, & Dunlosky, 2011; Szpunar, Jing, & Schacter, 2014). According to Kruger and Dunning (1999), low-performing students overpredict their exam performance because they are unaware of the information they do not know, and unaware of the fact that they do not know the information; they are "unskilled and unaware".

Accurate metacognition appears to be a general characteristic of high-achieving students. In fact, students' ability to accurately monitor their knowledge predicts their grade point average (GPA). Everson and Tobias (1998) asked students to state whether or not they were knowledgeable about words on a vocabulary list before taking an exam testing the same list. They found that the students who were better able to monitor their vocabulary knowledge had higher GPA's than those with poorer monitoring ability. Similarly, accurate metacognitive monitoring is associated with high SAT scores (Kelemen et al., 2007). Students with higher SAT scores were able to adjust their metacognitive monitoring and improve monitoring across multiple attempts to a greater extent than students with lower SAT scores. Further, students who can better monitor their reading can better improve their reading comprehension compared to those who are less able to monitor their reading comprehension (e.g., Thiede, 1999; Thiede, Anderson, & Therriault, 2003). Given this positive association between accurate metacognitive monitoring and performance, there have been multiple attempts to improve students' metacognition in the classroom, following the hypothesis that better metacognition may lead to better performance.

1.2. Interventions in classroom metacognition

The general procedure for metacognitive interventions in the classroom is to ask students to make an initial grade prediction either shortly before or after taking an exam. Students are then given some form of training, feedback, or incentive to encourage them to improve their grade prediction accuracy (or calibration) on subsequent exams (e.g., Bol, Hacker, O'Shea, & Allen, 2005; Callender, Franco-Watkins, & Roberts, 2015; Hacker, Bol, Horgan, & Rakow, 2000; Miller & Geraci, 2011a; Nietfeld, Cao, & Osborne, 2006; Nietfeld et al., 2005). As suggested by the term calibration, interventions aim to improve students' understanding of their own knowledge and performance on exams. The hope is that students might use the feedback or training to modify their predictions to more accurately reflect their knowledge so that they are better able to prepare for future exams, thus improving both the accuracy of their predictions and their performance. Multiple types of interventions have been attempted, all of which have targeted students' metacognition, but the effectiveness of these interventions has been inconsistent (e.g., Bol, Hacker, O'Shea, & Allen, 2005; Callender et al., 2015; Hacker et al., 2000; Miller & Geraci, 2011b; Nietfeld et al., 2005). These interventions either did not improve metacognition, or resulted in modest improvements with no effect on performance.

One interpretation for the difficulties in training students' metacognition in the classroom is that existing interventions have been unsuccessful because they target the wrong information by assuming that students make their predictions based on how well they know the material. If, however, students make their predictions based on what they hope to earn on the exam (their desired grades), then interventions that target metacognitive knowledge will be of limited utility. The current studies examine, one, whether students' exam predictions are associated with what they hope to earn on the exam, and, two, whether students can improve their exam predictions by reducing their reliance on their desired grades.

1.3. Motivational biases in metacognitive judgments and grade predictions

There is evidence that memory predictions can be partially affected by motivations and desires. For example, in laboratory studies using judgments of learning (JOLs), people predict that they will be more likely to remember items if those items are higher value than if they are of lower value (see McGillivray & Castel, 2011; Soderstrom & McCabe, 2011). Thus, even in a low-stakes laboratory testing context participants' motivations can influence their memory predictions. These results indicate that metacognitive judgements may be affected by motivation in addition to the cognitive features of the situation. One might predict that motivations would play a particularly strong role in classroom environments where students are in an "educational climate of high stakes testing" (Bol et al., 2005, p. 269). When students make predictions about how they will perform on an upcoming test, they may explicitly or implicitly consider how they wish to perform on the exam.

Some have suggested that students' performance predictions may help motivate future performance (Gramzow, Johnson, & Willard, 2014). These self-serving overestimations may be adaptive because they may help students focus on achieving their goals (Gramzow, Elliot, Asher, & McGregor, 2003; Taylor & Brown, 1988; Taylor, Lerner, Sherman, Sage, & McDowell, 2003a, 2003b). For example, Willard and Gramzow (2009) found that students who exaggerated their GPA and improved