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Using multiple calibration indices in order to capture the complex picture of what affects students' accuracy of feeling of confidence

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Abstract

The present study used multiple calibration indices to capture the complex picture of fifth graders' calibration of feeling of confidence in mathematics. Specifically, the effects of gender, type of mathematical problem, instruction method, and time of measurement (before and after problem solving) on calibration skills were investigated. Fourteen classes ($N = 389$ fifth graders) were randomly selected from two school mathematics programs, namely the gradual program design and the realistic program design. Students completed two different types of mathematical problems (a set of computation problems and a set of application problems) and reported their feeling of confidence (that they would find the right solution) when first reading the problem statement and again after they had produced the solution of each of the problems. Students' calibration skills were measured using three indices of calibration. Effects on the calibration of feeling of confidence due to gender, instruction method, type of mathematical problem, and time of measurement were found and are discussed.

Keywords: Metacognitive experiences; Calibration indices; Accuracy of feeling of confidence

1. Introduction

The cognitive demands that students are faced with in the classroom interact with the skills that they can bring to bear on the task, for instance mathematical tasks. There have been many attempts to describe these skills. For example, it has become clear that young students who are doing mathematical application problems need to be able to read the word problem and hold it in working memory in order to select the relevant and critical features, integrate this information, and coordinate the solution process (Beishuizen, Van Putten, & Van Mulken, 1997; Bull & Espy, 2006; De Corte, Verschaffel, & Op 't Einde, 2000).

1.1. Confidence while solving problems

Beishuizen et al. (1997) and Klein (1998) noted that students find application problems far more difficult than computation problems. Why is it so difficult for young students to do application problems? Flavell (1979) clarified that students, who have solved specific problems in the past, recognize these tasks because they have built up metacognitive knowledge, which implies that they have knowledge of the task as well as conditional knowledge of the strategies to solve the tasks. Flavell (1979) argued further that metacognitive knowledge has a dual function. First, it allows the student to monitor so as to form a representation of cognition. Second, it allows the student to exert control on cognition based on the mental representation. Chi, Bassok, Lewis, Reimann, and Glaser (1989) illustrated that successful learners differ from less successful learners on the grounds that they have access to metacognitive knowledge that they can bring to bear on the problem right from the beginning of task processing so that the outcomes of the monitoring process can steer and direct their problem-solving process (see also Pressley, 1995).

1.1.1. Building up metacognitive knowledge about the task

In accordance with Nelson's (1996) classical article on metacognition, Efklides (2001, 2006) made a distinction

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