MINUTE MATH: AN ACTION RESEARCH STUDY OF STUDENT SELF-ASSESSMENT*

ABSTRACT. Forty-one students in two third grade classes, including special education students, participated in an action research project conducted jointly by two university supervisors, three teachers, and three student teachers. The “Minute Math” project involved students in predicting and graphing their test scores on a weekly conventional timed test of the 0–9 multiplication facts. Students also reflected each week on their progress and the success of their studying and problem-solving strategies. Student self-assessment was successful at turning the rote memorization task of learning the times tables into a deeper experience for students about monitoring their own mathematics learning.

KEY WORDS: formative assessment, goal orientation, multiplication facts, student involvement in assessment, student reflection

1. INTRODUCTION

Memorizing the math facts tables is a part of the third grade curriculum in Pleasant Hills Elementary School (pseudonym). The primary purpose of this action research study was to see whether student self-assessment in the service of this required, rote activity would add desirable outcomes besides simple knowledge of math facts. It was expected that the higher-order thinking and metacognitive processes required for self-assessment would turn this rote memory task into an exercise in “learning how to learn” and contribute to students’ mathematical literacy development (Gellert, 2004). Memorizing math facts forms a large and important part of the third grade math curriculum and is not likely to diminish in importance soon because of the state testing program and because of parents’ wishes that students learn these facts. This study took place during the period when students were working on the multiplication tables. A secondary purpose of the study was to examine the use of action research as a professional development tool for the educators; these results are presented elsewhere.

Many assessment authors have made general recommendations to increase the amount of student self-assessment (e.g., Arter and Busick, 2001; Arter & Busick, 2000; Arter & Flowers, 2001).

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Black and Wiliam, 1998; Stiggins, 2001). The main reasons for this fall into two categories, motivational and cognitive. Motivation theorists suggest that student self-assessment will contribute to feelings of control over one’s own learning, of choice and of agency, and of self-worth (Covington, 1992). Theorists who focus on the formative feedback loop emphasize that the learning task requires students to compare their performance with desired performance and take steps to close that gap (Sadler, 1989). Accurate appraisal of their own work is a necessary part of this cycle.

Two reports of using self-assessment in high school mathematics were found (Csongor, 1992; Stallings and Tascione, 1996). The NCTM Assessment Standards for School Mathematics (NCTM, 1995) recommend student self-assessment as part of a total assessment plan to foster student confidence and independence in learning math. Stallings and Tascione (1996) reported their students who used self-assessment of particular errors in performance were engaged in their work and developed communication skills and math vocabulary, as well.

One study (Wood and Frank, 2000) investigated the effects of having fifth grade special education students use memory-enhancing strategies on their learning multiplication facts. This report was of particular interest because the goal, student learning of the multiplication tables, was the same as for this Minute Math study. For the special education students in Wood and Frank’s project, a teacher selected the particular learning strategies for students. In the third grade classes in this study, which did include some special education students, students were to choose from a variety of strategies. The choices of strategies themselves were part of weekly student reflections. To keep track of progress, Wood and Frank’s students kept graphs like the students in this study. Wood and Frank (2000, p. 82) wrote:

An important part of this instructional package is continuous data collection to determine each student’s progress in learning the multiplication facts. You can accomplish this by asking students to complete a multiplication facts worksheet two or three times per week as part of instruction. After the worksheets have been scored (and analyzed if errors have been made), each student should plot the results on a graph . . . . Most students are highly motivated when they observe the progress they are making and strive to reach the goal shown on their graph.

All three reports of student self-assessment in mathematics described here were descriptions of the work of individual teachers in their classrooms. No large scale controlled studies of student self-assessment in math were located. This study shares with the existing literature the characteristic of being situated in individual classroom settings. This may not be a shortcoming, but rather a statement about the nature of student self-assessment. The classroom assessment context is very important (Stiggins and Conklin,