Incorporating Geometry and Statistics into the Elementary Classroom

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Abstract

In 1992, the state of Pennsylvania introduced a new standardized test. This standardized test includes geometry and statistics, two subjects that have not traditionally been focused on in elementary mathematics curricula. This paper discusses methods of introducing geometry and statistics to preservice teachers, most of who only remember these subjects from secondary mathematics classrooms.

The PSSA (Pennsylvania System of School Assessment) Mathematics Assessment has made it necessary for changes in mathematics curriculum not only in K-12 classrooms, but also in classrooms where preservice elementary teachers are learning mathematics. In particular, the incorporation of geometry and statistics in the PSSA – especially on the fifth grade version of the test - has made it necessary for those subjects to be highlighted in any curriculum for elementary education majors. At Bloomsburg University of Pennsylvania that has meant the addition of a content mathematics course for elementary education majors - Geometry and Statistics for Elementary Education Majors. This course not only exposes preservice teachers to questions similar to those on the PSSA, but also enhances their job opportunities.

The following are two typical fifth grade PSSA questions, one regarding geometry and the other regarding statistics:

A student must determine the area and perimeter (in square inches and inches, respectively) of a checkerboard, given that the checkerboard has 8 squares by 8 squares and that a checker fits exactly into one square and is 2 inches in diameter.

Laura is taking a poll of her school to determine if a new recess time should be enforced. If there are 75 students in Kindergarten, 106 students in first grade, 82 students in second grade, 112 students in third grade, 113 students in fourth grade and 91 students in fifth grade and she only has time to poll 50 students, how many students from each grade must she poll to make her poll fair?
The above questions are paraphrased from real questions supplied by the Pennsylvania Department of Education. Questions from each year are typically similar to this in the categories of geometry and statistics. These questions typically pose much difficulty for elementary education majors. They were not exposed to problems such as these in their own elementary curriculum, and their experiences in high school with geometry and/or statistics typically make them unwilling to even attempt these problems. At Bloomsburg University, we have a course dedicated to geometry and statistics for elementary education majors. Our course begins with an overview of questions such as these, to motivate students during the semester. They seem more willing to learn methods to solve problems like these if they understand that they will be expected to teach their own future students these methods. It is explained to these students that even if they never plan to teach fifth grade, they will be expected to expose their own students to similar problems in younger grades, to prepare those students to take the fifth grade version of the PSSA Mathematics Assessment.

At the end of the course, students cannot only solve problems like the two above (using various methods, if applicable) but can also create problems like these for all elementary levels. Our students have typically found that with this kind of knowledge, they are better able to find the kinds of jobs that they are looking for. Many superintendents are looking for preservice teachers who are well versed in the PSSA Mathematics Assessment problems, and who can enter the classroom ready to incorporate these new types of questions into their curriculum. Moreover, since the students have been exposed to this kind of material in preparation for teaching fifth or sixth grade,
many have found jobs at the middle school level – where they have been able to enrich the experiences of their own middle school students.

The PSSA Mathematics Assessment has truly changed the way mathematics is taught in the state of Pennsylvania – funding for certain programs is tied to student performance on the PSSA. Thus, in the preparation of elementary teachers for these classrooms, it is necessary to incorporate all types of PSSA problems. These problems will not only make the students more job ready, but should also help the next generation of students to have a better understanding of all things mathematics.

Reference:
