A Case Study of Primary School Students' Use of a Dynamic Statistics Software Package for Analyzing and Interpreting Data

Irene Kleanthous
Cyprus Ministry of Education, Cyprus

Maria Meletiou-Mavrotheris
European University, Cyprus

EXECUTIVE SUMMARY

This chapter explores the potential of dynamic statistics software for supporting the teaching and learning of the Common Core Standards for Mathematics. It shares the experiences from a teaching experiment that implemented a data-driven approach to mathematics instruction using the dynamic data-visualization software InspireData© (Hancock, 2006), an educational package specifically designed to meet the learning needs of students in the middle and high school grades (Grades 4-12). We report on how a group of Grade 4 (about 9-year-old) students used the affordances provided by the dynamic learning environment to gather, analyze, and interpret data, and to draw data-based conclusions and inferences. The role of the technological tool in scaffolding and extending these young students' stochastical and mathematical reasoning is discussed.

INTRODUCTION

Advances of technology provide mathematics teachers with powerful new tools and opportunities for the teaching of challenging concepts to young learners. The appearance, in particular, of dynamic learning environments, provides an enormous potential for making complicated mathematical ideas accessible to young learners. These new technological tools are, in fact, designed explicitly to facilitate the visualization of mathematical concepts by providing a medium for the design of activities that integrate experiential and formal pieces of knowledge, allowing the user to make direct connections between physical experience and its formal representations (Pratt, 1998; Meletiou-Mavrotheris, 2003; Paparistodemou & Noss, 2004). Having such a set of tools widely available to students has the potential to significantly change the curriculum—to give students access to new mathematical topics and insights by removing computational barriers to inquiry (Rubin, 1999). Students can experiment with mathematical ideas, articulate their informal theories, use them to make conjectures, and then use the experimental results to test and modify these conjectures. There is evidence that use of such software in the mathematical classroom promotes conceptual change in students and leads to the development of a more coherent mental model of key statistical and probabilistic concepts (Bakker, 2004; Hammerman & Rubin, 2003).

In this chapter, we explore the opportunities provided by a dynamic data-visualization package for supporting the Common Core Standards for Mathematics. We share the experiences from a teaching experiment that explored the following question: *How can the affordances provided by a dynamic statistics learning environment be utilized in the early years of schooling to scaffold and extend children's stochastical and mathematical reasoning?* The study adopted a data-driven, project-based approach to mathematics instruction using the dynamic data-visualization software InspireData© (Hancock, 2006) as an investigation tool. It investigated ways in which young children can use the features of a dynamic statistics software package to formulate conjectures regarding real datasets of personal interest, and to test these conjectures through gathering, analyzing, and interpreting data, and drawing data-based conclusions and inferences.

BACKGROUND

The family of educational software in the teaching of mathematics that came to be known as dynamic software (dynamic geometry, dynamic statistics, dynamic algebra) and which integrate dynamic graphical displays with underlying computational models of fundamental mathematical structures, provide educators with the opportunity to