Exploring the Link between Preservice Teachers' Conception of Proof and the Use of Dynamic Geometry Software

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This study seeks to connect two well-established research strands. One is the role of proof in geometry, and the other is the link between teachers' subject matter knowledge and pedagogical content knowledge. Of particular interest is how secondary preservice teachers perceive the need for, and benefits of, formal proof when given geometric tasks in the context of dynamic geometry software.

Building on the work of Eves (1972), who conjectured that mathematicians determine truth by methods that are originally intuitive and empirical, and Lakatos (1976), who suggested the deductive format in which proofs are presented is misleading, Battista and Clements (1995) suggested that students should learn the meaningful use of proof by avoiding formal proof and focusing instead on justifying ideas and building visual and empirical foundations for later work. One way to do this is with dynamic geometry software, such as Cabri and Geometer's Sketchpad, which facilitate the making and testing of conjectures. Bershadsky and Zaslavsky (1999) also investigated how such dynamic environments impacted students' awareness of the intuitive, visual aspects of geometric situations, and described how this in turn was reflected in students' understanding of the ideas under study. Crisan (1999) suggests that the use of mathematical software both challenges and enriches teachers' subject matter knowledge as well as pedagogical content knowledge.

This report presents results of a case study of four preservice teachers as they solve two geometric problems posed in the form of questions, and then attempt to create formal proofs that generalize their results. The problems were chosen to be unfamiliar in their specifics, yet based on traditional Euclidean concepts. Thus, the preservice teachers were faced with issues of proof in areas that challenged their subject matter knowledge, and were asked to do so in a software environment that also challenged their pedagogical content knowledge. Preliminary results indicate that students see dynamic software as tool to make sense of proofs, but not necessarily helpful as a tool to create proofs.

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