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Fujita, Taro; Jones, Keith

Reasoning-and-proving in geometry in school mathematics textbooks in Japan.

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Summary: In Japan it is in grades 7–9, and primarily in geometry, that school students are introduced to the significance and methodology of proof in mathematics. As textbooks play a central role in everyday lessons in Japan, this paper presents an analysis of the geometry chapters of a selected mathematics textbook currently in common use with students aged 13–14 in grade 8. We show that the emphasis in the textbook is on ‘direct’ proofs of geometrical statements, accompanied by activities which encourage students to form conjectures. Based on our analysis, we raise critical issues related both to the strengths and weaknesses of such a textbook design on students’ understanding of reasoning-and-proving. The strengths, as evidenced by Japanese national data, are that most grade 8 students in Japan are able to construct suitable proofs – usually based on congruent triangles. The weaknesses, as verified by other research, are that the same students may not fully appreciate the necessity or generality of mathematical proof.

Classification: E53 G43 U23

Keywords: school textbooks; geometry education; reasoning-and-proving; Japan; congruent triangles

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