Cite as: D. Reid, K. Jones, & R. Even (2019). International perspectives on proof and proving. In M. Graven, H. Venkat, A. Essien & P. Vale (Eds.). *Proceedings of the 43rd Conference of the International Group for the Psychology of Mathematics Education* (PME43) (Vol. 1, pp.181-182). Pretoria, South Africa: PME.

INTERNATIONAL PERSPECTIVES ON PROOF AND PROVING

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This working group is a new initiative, bringing together research on proof and proving and international comparison. The aim is to foster research on proof and proving from an international perspective, and to continue at the next two PME annual conferences.

The past two decades has seen a strong increase in research into proof and proving in mathematics education. Much of this has been conducted in single national and cultural contexts. This means that it is not clear whether the results are transferable, or indeed if the assumptions on which the studies are based are valid elsewhere. There are four areas in which international comparisons could shed light on the teaching and learning of proof and proving: curriculum, teaching resources (including textbooks), student achievement, and teaching practices (the latter encompassing teacher knowledge and teacher education).

Very little information exists about the role of proof in curricula internationally. Existing curricular comparisons do not focus on proof, and the few comparisons that have focussed on proof have compared only a few contexts (e.g., Hemmi et al., 2013). Similarly, while teachers might be guided by textbooks or curriculum documents, existing research (e.g., Fujita, & Jones, 2013; Miyakawa, 2012) has compared such practices in only a few contexts. In international comparisons of student achievement (e.g., TIMSS and PISA), very little is known about how students' skills to construct and interpret proofs varies internationally. Results from a TIMSS 1995 item suggests that the variance might be quite wide (Reid, 2015). Comparisons of classrooms practices in teaching proof exist (e.g., Knipping, 2001), but, given the difficulty of conducting such research, are limited to a few contexts.

The Working group focuses on a series of research questions such as:

- To what extent, and to which students, is proof taught in different countries and what goals for teaching proof apply in different countries/cultural contexts?
- How do teaching resources for teaching proof differ between contexts?
- How capable in proof and proving are students in different contexts?
- What teaching practices for proof and proving occur in different contexts and how is teacher knowledge and teacher education developed?

Outcomes are intended to include a reference list of existing research on proof and proving from an international perspective, a preliminary report on the role of proof in national/regional curricula, textbooks, student achievement and teaching practices from the working group participants, and the organising of networks of researchers

2019. In M. Graven, H. Venkat, A. Essien & P. Vale (Eds.). *Proceedings of the 43rd Conference of the International Group for the Psychology of Mathematics Education* (Vol. 1, pp. 181-182). Pretoria, South Africa: PME.

interested in collaborating on comparative research focussed on curricula, textbooks, student achievement or teaching practices. The latter can begin at the working group meeting and continue after it.

STRUCTURE OF THE SESSIONS

Involvement of participants is essential to the functioning of the group. Over the two sessions the following activities are planned:

- Introduction to the working group, research questions, and the focus areas of curricula, textbooks, student achievement and teaching practices.
- Introductions of participants and identification of overlapping experiences in various national contexts.
- Formation of context specific subgroups, to prepare initial sketches of the relative importance of textbooks and curriculum documents in each context, the role of proof in the curriculum and textbooks, and existing research on proof and curricula, textbooks, student achievement and teaching practices in each context.
- Brainstorming of collaborative projects focussed on specific research questions and focus areas.
- Formation of project specific subgroups, to prepare initial sketches of the project and to outline plans for the coming year. Participants can choose to be involved in a project as leaders, participants, or informants, according to their degree of interest

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