Students and Proof: Bounds and Functions. A DVD for Mathematicians
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Using funding made available by the Maths, Stats & OR Network I have produced a DVD for mathematicians who want to understand more about the way their students think while trying to construct proofs.

The DVD contains material from two research interviews, in each of which a student attempts to answer proof tasks about upper bounds of sets of real numbers and about functions and maxima. The video content is specially annotated so that half of the screen shows the student as they work on the problem and the other half is white and has subtitles appearing in blue at the bottom and a printed version of what they are writing on the page at the top (see Fig 1 for a screen shot). This allows the viewer to follow the student’s thinking without being distracted by having to switch between document types. The content is also broken up into short (approximately 2-minute) excerpts, each of which is followed by a screen with suggestive questions to facilitate reflection on the material and/or discussion between colleagues.

Watching the content highlights a number of major causes of student difficulty in learning to construct proofs, including:

- possessing standards of justification different from those held by mathematicians;
- lack of appreciation for the role of definitions in formal mathematics;
- errors in logical reasoning, particularly when this involves quantifiers and/or “if…then” statements;
- restricted knowledge of examples of important mathematical concepts; and,
- lack of proof strategies and/or difficulty in applying these effectively.

The DVD has extra materials indicating where the viewer can find discussion of these issues in the mathematics education literature (for an introduction to this literature designed for mathematicians, see also [1]).

Further information about the DVD content and about feedback from mathematicians at the 3rd Irish Symposium for Undergraduate Mathematics Education appeared in an earlier MSOR Connections article [2]. Further discussion relating its content to mathematics education research literature appeared in a paper at the Conference of the International Group for the Psychology of Mathematics Education [3].

A copy of the DVD will be sent to your institution’s MSOR Network key contact. Additional copies (subject to availability) can be obtained by contacting Janet Nuttall at j.nuttall@bham.ac.uk.
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References

