Mathematical Massive Open Online Courses (M-MOOCs): ICM 2014 Panel Brief

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Note that the title of this Panel is Mathematical Massive Open Online Courses (M-MOOCs): not "MOOCs in general". Though we could have a long, and interesting to some, debate on general questions about MOOCs, this is the ICM and we should focus on Mathematics. What might make Mathematics a special subject for MOOCs? Here are some thoughts.

1. The highly sequential nature of mathematics: it is little use trying Analysis II until one has done Analysis I, and so on. In a given university, Directors of Studies (or their equivalent) carefully plan a cursus, and write list of pre-requisites etc. An *individual* MOOC provider might do the same (though there is little evidence of this so far), but there is currently no evidence of a general catalogue/list of prerequisites.

This is not helped by the language of mathematics: "Elementary Proofs of the Prime Number Theorem" is unlikely to be "elementary" in the usual sense (OED 7a: "Rudimentary, introductory") of the word.

2. The notation. Many Virtual Learning Environments do not support the display of mathematical notation well, and certainly not the construction of mathematical notation "on the fly". Equally, entering mathematics is often difficult for students. Notation is also not as universal as is commonly believed, and a student who learned arithmetic the Spanish way, even though fluent in English in general, may wel be baffled by Anglo-Saxon long divison of polynomials (or *vice versa*).

However if this barrier can be crossed, MOOCs way well be a means of getting advanced mathematics to those who would not otherwise have the opportunity (as closed online courses already do).

3. The fact that mathematics is a practical subject: one learns by doing. It is not clear how MOOCs can support the sort of routine exercise that is a vital part of learning mathematics. Multiple Choice Questions do not fit the bill here.

There are solutions to some of these problems, but they are not widely known, and not in the "mainstream" VLE/MOOC systems.