

MATHEMATICS IN THE TIME OF MOOCs

organized by

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Workshop Summary

The goal of this workshop at AIM was to assemble and build a community of mathematicians vested in the long-term project of enhancing mathematics instruction by creating, sharing and using online resources. During the workshop, the group developed the following mission statement:

Mission of the Open Online Mathematics Community:

- To create and make accessible quality open online mathematics content in order to enhance mathematics instruction at all levels.
- Within the academic framework the creation of such content should be identified as a scholarly activity.
- To have mathematicians lead the creation, dissemination and evaluation of open online mathematics content.
- To encourage, foster, advance, and promote free and open access to online educational materials for mathematics.
- To develop, distribute, and disseminate software for free and open mathematics courses.
- To increase the public's access to mathematics.

Having identified this mission, working groups were formed to discuss a variety of topics such as student engagement in online classes, how to create and teach a Massively Open Online Course (MOOC), how to use MOOCs in the teaching of hybrid/blended/flipped classes, available and desirable tools for creating and teaching with MOOCs, the availability of open mathematics content, MOOC research, building a mathematics major curriculum, best practices for creating a MOOC, licensing issues, upper division and graduate level MOOCs, MOOCs and the mathematics profession, sustainability, the assessment of MOOCs, as well as the creation of an Open Online Journal of Mathematics Courseware.

A web page is being created at

<http://mathematicsmoocs.org/>

to be hosted at AIM, which will contain summaries and reports from all working groups. This website is going to be a focal point for moving the Open Online Mathematics Community forward. Additionally, longer reports and documents are being created in the following areas:

MOOCs and hybrid/blended/flipped classes: While blended learning offers many enticing benefits, there is a substantial learning curve to creating quality online materials. Existing MOOCs can serve as a ready resource for these blended courses. This document will serve as a guide to teaching a blended/flipped class, with a particular focus on using available open online content to aid in content delivery.

Mathematics MOOCs wishlist: This report contains a list of features that don't currently exist but that we would like to see implemented in MOOC platforms in order to make mathematics content delivery more effective. The wishlist is being shared with major MOOC providers, like Coursera and EdX, to help guide development.

Best practices: A MOOC is not just a collection of videos. It is important that all areas of a course come together to form a cohesive experience for students. This document contains a variety of suggestions and best practices for the creation of MOOCs.

Student engagement: Instructors of MOOCs should seek to captivate the interest of students while also pursuing course objectives. Most good "traditional" classes involve a two-way interaction between the instructor with the students as well as interaction between students. This suggests that a MOOC might make some attempt to also engage the student not only intellectually but also personally. MOOCs might consider ways to replace these interactions with activities that can captivate the student's attention. This document contains possible practices that are possible to implement, given the current technology and platforms.

Many interested MOOC authors may find themselves to be the only MOOC author at their institution, so events which bring together these participants can act as incubators for multi-institutional collaborations. An important aspect of the groups discussions concerned the planning of future events such as a larger conference this coming summer. A proposal to the Fields Institute has been submitted and is being currently evaluated, with the objective of hosting a workshop in the summer of 2014. Further events will be posted on our web site.

Some of the ideas discussed during this workshop, such as the founding of an Open Online Journal of Mathematics Courseware, are rather ambitious and will require grant funding. A group was formed that will write proposals to request funding in order to implement some of these far reaching objectives.

Mathematicians, in contrast to many other MOOC authors, are in a strong position to both generate the course content and then, armed with domain knowledge, analyze the student data that will lead to refinements in the student outcomes for their courses. A major objective of the workshop and of our future events is to share best practices for doing so.