

Research Statement

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07.10.2011

I'm a Ph. D. research student in the Knowledge Media Institute at The Open University, UK. The working title for my thesis is "Peer Supported Problem Solving & Mathematical Knowledge".¹ I expect to complete the Ph. D. at the end of 2012. My supervisors are Dr Alexander Mikroyannidis and Dr Peter Scott.

Research Question How can the ability to deliver learning interactions online in a peer-produced context be used to deliver improved support for informal study of mathematics at the undergraduate level?

Research Approach Everyone who has studied mathematics is familiar with thick, expensive, mathematics text books. When paired with lectures and homework, textbooks provided an adequate method for delivering mathematics instruction in the 20th Century. But now that we have the internet, can we do better?

Online peer-production communities have successfully built operating systems and reference works. I am taking one of the later, the mathematics encyclopedia at PlanetMath.org, and using it as the core knowledge resource in an online learning environment that will host interactions around mathematical problem solving. The first step for me in my Ph. D. project has been to collaborate on building a tool – namely, a new version of PlanetMath's online platform – ready to accommodate the enhancements that will be needed to support problem solving interactions. The next step has been to devise a methodology that is suitable for understanding and supporting learning in this new space. While it would be possible to evaluate the system as a whole by using standard pre- and post-test techniques, I'm more interested in what happens in the middle. Thus, the next phase of my research will be focused on text and hypertext/interaction analysis that aims to measure, support, and advise on learning. For example, a typical user question I would like to be able to answer automatically is: "Help me find an easier related problem". Starting in January, I plan to evaluate user experiences with the system in small-scale pilots (classroom studies) and, hopefully, "live on the internet", on the "new" PlanetMath.org.

Main things I have learned about doing research

"We solve the *whole* crime. We find the *whole* person. Phone today for the *whole* solution to your problem."²

When I started my Ph. D., everyone kept telling me to focus. I don't think I knew how to do that when I started. I was used to a very "holistic" approach, in which everything from anthropology to 'zines were somehow relevant. Working remotely with a disciplined and productive group of collaborators, and meeting weekly with my supervisors, I've seen how important it is to keep progressing on a concrete body of work. It's not just about being willing to put in long hours, but engineering a workflow that feels productive (and satisfying) on a daily basis. In the end, my revised approach is probably no less holistic, just more disciplined.

Major hurdles As I explored the problem more deeply, it became clear to me that there was enough work in the first phase to keep a person busy for most of the available time, particularly me, since I'm a novice with the software systems we're using. I decided it would be useful to apply for a grant to bring in a full-time developer for a few months. In my first attempt at this, I failed to get the grant out the door, due to difficulties in the team-building phase, and annoying details in the call's small print. I believe I will have everything in order to bid for a smaller amount of money in October, 2011. I've also tried to restructure my work into "good enough" and "more ideal" packages, so that I have a reasonable degree of security about completing, with or without the grant.

References

1. Joseph Corneli, "Peer Supported Problem Solving & Mathematical Knowledge" (thesis outline), [HTTP://METAMESO.ORG/~JOE/THESIS-OUTLINE.HTML](http://metameso.org/~joe/thesis-outline.html)
2. Douglas Adams, *Dirk Gently's Holistic Detective Agency*, Pan Macmillan (new edition), 1988.