



Nalini Joshi*

M.A.G.I.C. (Mathematical Games and Interactive Course)

To promote scientific knowledge in Australia, the Australian Academy of Science has developed two widely admired educational programs *Primary Connections* and *Science by Doing* with the aim to inspire, engage and support school students and teachers in science. I write this column to let you know about a proposal that the National Committee for Mathematical Sciences is currently discussing to develop a program in mathematics to be offered in parallel with the *Science by Doing* program for high school students.

Most mathematicians would agree that mathematics is an indelible part of Science, but the two have been separated by a hard boundary in teacher education and curriculum development in Australia. Because of this separation, many science teachers profess a lack of confidence in tackling mathematical content. The proposal in discussion suggests that the Academy develop an inquiry-based program in mathematics tentatively called Mathematics and Games Interactive Course (M.A.G.I.C.).

When I spoke about this proposal at the recent meeting of the Australian Heads of Mathematical Sciences (ACHMS) meeting in Melbourne, the questions I received asked for clarification on how it might overlap or compete with other existing widely praised programs for mathematical sciences. These include the CSIRO Mathematicians and Statisticians in Schools program, the AMSI teacher development programs, the National Mathematics Summer School and the Australian Mathematics Trust enrichment and training programs for mathematics competitions. All of these engage with students and/or teachers in high schools by offering face-to-face or email-based interactions between specialists or mentors and students or teachers. Some of these run all year during school terms, whilst others run in certain time periods such as school holidays or development days that lie outside teaching periods. Some are designed for groups of students of particular ability, whilst others seek to engage students or teachers at all levels.

The M.A.G.I.C. proposal is different from all of these because it is based on a sequence of web-based modules as in *Science by Doing*. This comprehensive online program for years 7 to 10 consists of units that provide a sequence of hands-on and interactive activities to support the implementation of the Australian Curriculum: Science. An important element consists of digital resources for students containing engaging activities that include video and audio clips to help students understand complex science concepts. Other elements in the program are a student guide and

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a teacher guide for each unit. The program is freely available to all schools. The program is also supported by a well researched professional learning approach with digital professional learning modules. All the material for Science by Doing can be found at <http://www.sciencebydoing.edu.au>.

I was at the launch of the Science by Doing program at the Academy in October 2013. Students who were driving the displays of the online modules at the launch told me they very much enjoyed the interactive interface and wished they had similar modules for mathematics. These are students who also have access to other programs, such as Scientists in Schools, opportunities for participating in Science competitions and whose teachers participated in teacher development programs. Yet the Science by Doing program widened and deepened these students' engagement with science in new ways.

The aim of the proposed inquiry-based program is to help students re-engage with mathematics and in turn support the development of mathematical and scientific literacy in the Australian community. It is anticipated that M.A.G.I.C. will focus on the students' experience through learning processes that use digital technology in innovative ways, and at the same time, support the implementation of the Australian Curriculum: Mathematics and complement what is being developed for teachers. The modules developed for one year will be made accessible and adaptable for students with varying levels of interest or advanced/lessened achievement in other years. The template for the proposed program will consist of a student digital platform, a student resource for hands-on activities, a teacher guide and classroom resources and assessment items that are provided in an editable format adaptable to the needs of each class and teacher.

This proposal, if we undertake it, will require substantial support to come to fruition. If we decide to go ahead, the next step is to seek financial support from federal and state governments. It requires not only financial support but also champions in the mathematical community. The Academy has asked the National Committee to engage with the mathematical community to consult about the proposal. I look forward to your feedback.



Nalini Joshi is the Chair of Applied Mathematics at The University of Sydney and was the President of the Australian Mathematical Society during 2008–2010. She was elected a Fellow of the Australian Academy of Science in 2008, became the Chair of the National Committee of Mathematical Sciences in 2011, and was elected to the Council of the Australian Academy of Science in 2012.