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Application Form for the CMS 2019 Endowment Grants Competition Deadline September 30

Title of Proposal

Proposal for funding two Grade 12 Teacher Workshops August 2020

Contact information

The one person and place to communicate with the applicant(s).

Name	peter taylor
E-mail	peter.taylor@queensu.ca
Telephone	16135332434
Fax	16135332964

Institution or department to administer grant funds

Name	Mathematics&Statistics		
Address	Queen's University	Contact	Peter Taylor
	48 University Ave.	E-mail	peter.taylor@queensu.ca
	Kingston, ON K7L 3N6	Telephone	16135332434
		Fax	16135332964

Summary

Less than 100 words

Total amount requested in this competition $

Our Grade 11 RabbitMath curriculum defines a new structure for high school mathematics curricula. It consists of 15 projects that together cover the Ontario Ministry guidelines. In August 2019, thirty Ottawa teachers spent 2 days working with the curriculum and many have now taken it into their classrooms. This coming year, we will complete the development of RabbitMath Grade 12 (Advanced Functions and Calculus&Vectors). Our plan is to hold workshops in August 2020 both in Ottawa and Toronto. Fields and CMS cosponsored our 2019 workshop and we are now seeking funding from both for these two workshops.

Applicants

Put any specific information on the relevant experience or expertise of an applicant in "Other".

Name(s)	peter taylor	Chris Suurtamm	
E-mail	peter.taylor@queensu.ca	suurtamm@uottawa.ca	
Position	Professor	Professor, Vice-Dean Research and	
Employer	Queen's University	University of Ottawa	
Address	48 University Ave.	145, Jean-Jacques-Lussier Private	
	Kingston, ON K7L 3N6	Ottawa, ON K1N 6N5	
CMS Member #	003846		
Current grants	NSERC, SSHRC, Math Knowledge Network	SSHRC, CFI	

What you propose to do

at most 40 lines

A significant objective of the RabbitMath approach is to provide a structurally more sophisticated curriculum that will prepare students for university. In a word, the curriculum is crafted with “the mathematics of mathematicians.” Along with this, there is an emphasis on hands-on student engagement, manipulatives and animations, and collaboration and communication. Our partnership with Callysto allows us to put Jupyter Notebooks onto the screens of all the students and our objective is to teach them enough Python that they can construct diagrams and build animations. The problems are “low-floor, high-ceiling” giving students at all levels an opportunity to engage with the material and facilitating peer-interaction in mixed groups.

Our 2019 August workshop took place over two days. That was important as the teachers needed the first day (mainly presentations) to get a sense of the curriculum and then on the second day, they worked in the morning in small groups on problems and in the afternoon they made presentations. In this regard it needs to be emphasized that while there is a lot written about the importance of the “process” of doing mathematics with activities that are meaningful, most teachers have very little experience with this style of curriculum, either in their professional lives or in their own formal education. Thus the emphasis in the critical second day was on facilitating the curriculum and working with the students. The teachers found this experience valuable and excerpts from our feedback surveys are provided below.

A two-day workshop requires accommodation for those who are not local, and our budget was small so that almost all participants were from the Ottawa area. For this reason we plan next year to hold our Grade 12 workshop in two locations, Ottawa and Toronto, to allow as many teachers as possible the opportunity to be “local.”

The teachers found that the August workshop gave them a high level of professional activity. We illustrate this with a few of their comments. “Let me begin by saying that this workshop was the most challenging, stimulating and relevant secondary mathematics PD I've engaged in yet.” “Collaborating with teachers, university students, and professors was a first for me and definitely enhanced my learning experience. I will use this curriculum to teach two classes of MCR3U this year.” “This was an incredible experience that I would encourage all secondary mathematics teachers to have. The problems, both mathematically and pedagogically, offered fantastic opportunities for us teachers to collaborate.” “The material allows students to work collaboratively on a rich task that incorporates many different curriculum outcomes. The flexibility of the curriculum allows for a variety of uses and entry points.” “I also appreciate that we got time to really dig in and anticipate what working through one of these problems with a class would look like.” “I can't think of any 2 days since I started teaching over 20 years ago, in which I generated more ideas about the math itself.”

Budget

Use Tab key to navigate

Description		Revenue			
registration 80X40		3200			
Fields request		10000			
Math Knowledge network request		1000			
Queen's and Ottawa U		520			
	CMS Endowment Grant requested	2000			
	Total Revenue $	16720			
		Expenses			
travel: 20X$300		6000			
Accommodation 20 X $200		4000			
Meals and refreshments (2 Lunches, 4 breaks, for 70)		5120			
Workbooks (80x$20)		1600			
	Total Expenses $	16720			

Funding, partners, revenue potential, information on applicants such as publications or awards, at most 20 lines.

Other

Funding. There are no obvious sources of funding for curriculum development. Perhaps the reason for this is that most such projects produce textbooks whose sales fund the work; however all our materials are open source. In 2019 our workshop received support from the Ontario Math Knowledge Network ($500), from the Fields Institute ($4000) and from the CMS Endowment Grant ($800). In addition we are going forward with a 2-year SSHRC Insight Development Grant ($69,200). However this is a separate project and does not fund curriculum development or teacher workshops. Rather it provides funds to send researchers into the classroom to observe the process of teaching and learning in the RabbitMath classroom.

Peter and Chris are both experienced researchers, one in mathematical biology, the other in mathematics education. Over the past 25 years both have worked extensively in the high school mathematics classroom, and with the Ontario Ministry on curriculum revision and pedagogical programming. Peter is a former Canadian Representative to ICME, a former member of the CCA Expert Panel on STEM Preparedness, is a 3M Fellow, a Fellow of the CMS and a Fellow of the Fields Institute. Chris is Director of the CFI-funded Pi Lab, was the Canadian representative on the NCTM, the Co-Chair of the Ontario Ministry of Education Early Math Expert Panel, and Co-Chair of several international panels on assessment in mathematics education.

Two recent papers that address this body of work are

Taylor, P. Teach the Mathematics of Mathematicians. Educ. Sci. 2018, 8, 56; doi:10.3390/educsci8020056 http://www.mdpi.com/2227-7102/8/2/56/htm.

Taylor PD. The Conversation: http://theconversation.com/mathematics-is-about-wonder-creativity-and-fun-so-lets-teach-it-that-way-120133 July 2019

Project start date Aug 27 2020 Finish date Sept 1 2020