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***New perspectives on identification and fostering mathematically gifted students:
matching research and practice***

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This special section of vol8,nos1&2 of *The Montana Mathematics Enthusiast* is a result of tremendous enthusiastic team work of many outstanding mathematics educators worldwide who are concerned with the issues related to mathematical giftedness and devoted to share with the international community their ideas, research results and best practices. The idea of the special issue on mathematical giftedness arose during the Topic Study Group 6 (TSG6) meeting at the 11th International Congress on Mathematics Education (ICME-11) in Monterrey, Mexico, in 2009 led by Viktor Freiman and Ali Rejali in collaboration with Mark Applebaum, Pablo Dartnell, and Arne Mogensen. More than 60 participants and 20 presentations resulted in invitations to scholars to share their findings in extended papers that meet the high standards of *The Montana Mathematics Enthusiast*. Each paper was rigorously reviewed by at least two renowned scholars. As a result of our work, we present 11 papers in this issue, 8 of which arise from the TSG6 work and 3 others are original papers written especially for this issue.

Dealing with the topic of mathematical giftedness is a very delicate and complex task because of the existence of multiple views, cultural perspectives, and pedagogical approaches to the subject. There is a growing interest of the mathematics education community in the field of giftedness and creativity that is supported by the intensive continuous work of the Topic Study Group on Activities and Programs for Mathematically Gifted at ICMI's Congresses, International Conferences on Mathematical Creativity and Education of Mathematically Gifted, as well as several recent publications

(Leikin, Berman, and Koichu, 2009; Sriraman, 2008; Sriraman, Freiman, and Lirette-Pitre, 2009; Sriraman and Lee, 2010).

Students we talk about can be identified by means of different terms (gifted, talented, promising, etc.) and different tools (psychological tests, standard assessments, school marks, teachers' observations, etc.) based on variety of criteria (problem solving behaviour, cognitive abilities, multiple intelligences, personal attitudes, etc.) and (or) their combination. Researchers and practitioners mostly agree that those students have special needs, deserve particular attention and require a different teaching approach.

At the same time, it seems that many mathematically gifted students may remain non-identified and non-nurtured in regular classrooms; they may even have difficulties complying with regular school routine and, under certain circumstances, become underachievers. Thus, their high potential may not be realized and get lost for the society which is in odds with modern trends of more inclusive school systems that care of all students helping them to become active, engaged and well-rounded citizens of the modern world. Although separating those so called gifted students from the school system may change their natural growth and diminish their ability to work with others, and also damage the level of other schools (Hatamzadeh and Rejali, 2008).

The work of the similar Topic Study Group at the ICME-10 has identified four main issues related to activities and programs for mathematically gifted:

1. Characteristics of giftedness and how such students can be identified.
2. Having identified the group of gifted students, it is now necessary to consider how such students should be met both inside and outside of the classroom.
3. Considering the materials that were presented to gifted students and discussed in particular, technology that might be of use.
4. Specific examples of problems and investigations.

By organizing our work at the ICME-11, we formulated following questions in order to pursue and extend our investigation:

- a) What do we know from recent literature on the subject of mathematically gifted students?
- b) Who is a mathematically talented student? What are her or his characteristics? What are the differences between the terms “mathematically gifted, mathematically promising, mathematically talented, mathematically able, and mathematical genius and others used by researchers and practitioners? How does it vary from one country to another?
- (c) How can we identify them? What are the ways to search for mathematically gifted students at different ages and settings?
- (d) How do we deal with students and kids who think they are (or their family think they are) mathematically gifted, but they are not according to identification criteria?
- (e) What is the societal phenomenon of overreacting to mathematically gifted student and how it may affect the life and the future of these students?
- (f) How do mathematically gifted students work with mathematics? What are their strengths and weaknesses on the subject? What are their attitudes and performances? How should we take all this into account in our teaching and assessment practices?
- (g) What are special needs for mathematically gifted students (additional trainings, their school and everyday life experiences, their works at home, participation in extracurricular activities such as problem solving, mathematics clubs, mathematics houses, competitions, etc?)
- (h) What should educational systems do in order to meet the needs of mathematically gifted? What are the (positive or negative) effects of curriculum as well as its implementation in practice inside or outside school on the development of mathematically gifted students?

(i) How should we teach mathematically gifted students (at different levels) and provide extra curriculum activities for them? How can we, as educators or teachers, help them to be more creative?

(j) How should we prepare teachers to work with mathematically gifted students?

(k) What are the challenges for gifted students and their mentors and how can these challenges be addressed?

(l) What is the future of mathematically gifted students and how can we help them realize their potential?

(m) What are the resources on the subject? What role may technology play in providing additional resources for mathematically gifted?

(n) What are other issues useful for further studies on the subject that are not mentioned in previous questions?

Neither the work of the particular group nor a special issue on mathematical giftedness could cover all aspects raised above questions. However, papers presented in this issue bring new perspectives in theoretical and methodological work, as well as their implementation in practice. Some other results have been presented at TSG6 in ICME-11 (<http://tsg.icme11.org/tsg/show/7>).

The eleven papers feature four themes: state of the research in the field and promising paths (Roza Leikin), *programs for gifted students* in different educational settings and cultures (Harvey B. Keynes and Jonathan Rogness; Arne Mogensen; Angela M. Smart; Mark Saul), *teacher education and professional development* (Mark Applebaum, Viktor Freiman, and Roza Leikin; Manon LeBlanc and Viktor Freiman), and *mathematical content, teaching approaches, and assessment* (Ed Barbeau, Paul Betts and Laura McMaster, Margo Kondratieva, Ildiko Pelczer and Fernando Gamboa Rodriguez).

We would like to thank the ICMI for inviting us to organize the Topic Study Group at the ICME-11, all participants of this group, all authors of papers for this issue

and reviewers who did a tremendous work of giving valuable comments and suggestions of how to improve the papers. We should acknowledge the help of Arne Mogensen and Mark Apelbaum as the associate editors, as well as many colleagues who acted as referees of the submitted papers for this issue: Agnis Andzans, Edward J. Barbeau, Scott A. Chamberlin, Lyn English, Sharade Gade, Gerald Goldin, Djordje Kadijevich, Alexander Karp, Petar Kenderov, Margo Kondratieva, Gregory Makrides, Peter Mitchell, Claus Michelsen, Sergey Pozdnyakov, Arthur B. Powell, Linda Sheffield, Peter J. Taylor, and Zalman Usiskin. All of them deserve special thanks.

Finally, we would like to thank Bharath Sriraman and the Editorial Board of the Journal for organising the special issue, the external reviews and hope the readers find the articles enjoyable and useful for future work on mathematical giftedness.

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