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TSG 6

Some thoughts on gifted school students, panel discussion

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First I would like to thank Viktor and Ali for convening this group and inviting me to contribute. My main qualifications for contributing are from my role of Executive Director of the Australian Mathematics Trust, the dominant supplier of enrichment and challenge for students in Australian schools, and as co-chair of ICMI Study 16, the Study Volume for which will be published hopefully at the end of 2008.

Challenge

Clearly the ICMI Study highlights an important issue in education and the learning process generally, which has never been documented or studied overtly as it should. Traditionally the learning process probably contained more challenge than it does today. However, particularly in Western countries, like mine, syllabi have become more and more refined, and available time for teaching mathematics has so significantly declined, that many teachers have time only to deliver knowledge and not to challenge. Since people need to react to challenging situations during their careers and everyday life, a vital part of the learning process may be lost.

I will refer the reader to the Study Volume to many aspects of this, including the very definition. Here I will assume that providing challenge is a vital part of the process of teaching the gifted student.

How is Challenge Provided?

The Study Volume (Chapter 2) will describe the variety of sources of challenge. These sources vary significantly from country to country. In Australia, our organisation provides challenge as part of a whole range of events and activities, but in these activities an inclusive competition is the entry point. The challenges we provide are based on an extended mathematics syllabus, accessible to school students. These topics include enumeration techniques, pigeon-hole principle, invariance, Diophantine equations and various problem solving techniques which will be described in section 1.4 of the Study Volume.

In other countries there are not such similar organisations and challenges for gifted students come from a range of sources.

Who are the Gifted Students? Identification

In my case I am interested in providing challenge for all students, as gifted students might not yet be otherwise identified. I have run enrichment classes for gifted students in Canberra and

have noticed that quite often the students who solve the most challenging problems are not those who get the top scores in normal classroom testing. As a result I am not convinced that normal testing identifies the most gifted students. Therefore my main interests are in finding the right method for testing the wider population as much as possible with a test which includes applying the student's mathematics knowledge in solving problems to which they can relate.

Acceleration v. Enrichment

In Australia, particularly Adelaide, there has been a wide debate on whether it is better to promote a student or hold them back. In Adelaide this is particularly an issue as it was there that Terry Tao, now a Fields Medallist, was discovered. Terry was a prodigy from the earliest times, and it was allowing him to write the inclusive Australian Mathematics Competition which enabled him to be formally discovered. As a ten year old he won a prize, writing with the oldest secondary students. He joined the Australian Olympiad training program, and in three successive years he won a Bronze, Silver and then Gold medal at IMO while only 10, 11 and 12 years old. He is still the only student who has ever won an IMO Gold Medal before turning 13.

Terry was a special case and was promoted. Promotion for Terry was justified because of his exceptional ability. However a number of people in the gifted student community, particularly in Adelaide, have pressed for advancement as an automatic right. It is normal in Adelaide for Year 11 students to take a Year 12 subject and the University has bowed to pressure to make its units in various subjects, not just mathematics, available to secondary students.

This has caused the general cohort structure to break down, with students, particularly talented students, studying at various levels and not staying in their social groupings. I would argue that mathematics is such a vast subject that there is no need for students to do this in mathematics. Our organisation provides course material for students from Years 5 through to 10, and if they make the Olympiad training they access even more mathematics without the need to accelerate. This seems to accommodate our most talented students and ensure that students can stay socially with other students in their school year. It also means they learn a lot more mathematics in the end than they otherwise would by simply going to the next year to learn something they were inevitably going to learn otherwise.