

ICME 10 : Efforts to introduce younger students to statistics and probability.

Collaboration by the Royal Statistical Society and the National Academy for Gifted And Talented Youth to encourage students to study Statistics

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Scenario: The Royal Statistical Society (RSS) and the National Academy for Gifted and Talented Youth (NAGTY) teamed up to run sessions to encourage students to take up mathematics and statistics beyond school leaving age. This paper describes the rationale of setting up and running events to meet the needs of NAGTY as well as the RSS outreach programme for pupils. The event and programme had been advertised as suitable for Academy members with a “willingness to think and solve problems” [1]. One of the many great things about Statistics is that, in most classes, interpreting data rarely gives rise to any truly ‘wrong’ answers and students of all abilities can contribute to discussion. With a group of advanced students, in this case led to a volley of questions, feeding back to them their findings and suggestions of possible solutions.

Gifted Students

Gifted students are often described asynchronous i.e. their chronological age and academic ability may be at different levels. How can talented students be encouraged using their ‘gift’ and in particular advancing further in developing this talent, is a question posed by many. Research by Buescher & Higham [2] suggest that students that participate in special programmes for the gifted were less likely, as they grew older, to mask their true abilities, where as Olszewski-Kubilius & Kuileke [3] point out that the pull of cultural acceptance often drive students to conform rather than develop their full potential. In the UK, NAGTY is trying to address these issues by providing special events to help these gifted students. This paper describes a collaborative event that aims to develop the students potential in the academic area of statistics.

Why the RSS Education Strategy Group wanted to join NAGTY in this collaboration

The RSS strategy for education was approved by their council on 16th October 2002 [4]. The RSS has always been concerned and willing to promote education. An example of this is its support for the RSS Centre for Statistical Education at Nottingham Trent University, UK [5] and throughout its meetings and publications programme. Recently, aware of the serious lack of suitably educated and qualified statisticians to meet the considerable demand from government, education, industry and commerce the RSS established the Education Strategy Group (ESG). The ESG coordinates the educational activities of the RSS. Membership of this group comes from a cross section of professionals with expertise from elementary education to university education. To try and encourage talented youth to enter the statistics

employment market the RSS ESG teamed up with NAGTY to provide innovative outreach events.

NAGTY

In the white paper ‘School Achieving Success’ [6] the UK Government announced its intention to establish an Academy for Gifted and Talented Youth. This Academy’s remit was to develop, implement, promote and support educational opportunities for gifted and talented children and young people up to the age of 19, as well as providing support for parents and educators. The Academy is based at Warwick University (UK) and works with its core partners namely the ‘Research Centre for Able Pupils at Oxford Brookes University (UK)’ and the ‘Centre for Talented Youth at John Hopkins (USA)’ together with a wider network of partner universities and professional organisations such as the University of Durham, the London School of Economics and Political Science, the University of York and the Royal Statistical Society to name but a few. The Academy began its provision with its pilot programme in the summer of 2002. The RSS held its first outreach event during July 2003. See the following website:

<http://www.warwick.ac.uk/gifted/outreach/02-03/reviews/simulations.htm>

Outreach Events

The RSS is committed to education and to supporting teachers, schools and outreach activities that promote the teaching of statistics to all. The RSS ESG already provides workshops for students and teachers, a schools lecture series, the CensusAtSchool international programme and many other outreach activities relating to statistical education. Outreach events form a major strand of NAGTY’s Academy work. The aim is to provide opportunities that compliment a student’s school experience and allow students to engage with specialist opportunities that are difficult to provide within the normal school context [7]. Statistics, as a subject in its own right is rarely taught as a major stream in the UK so providing material outside the standard curriculum was not a real issue. The RSS ESG decision to work with the Academy was primarily to bring to the forefront statistics as a subject in its own right as well as complimenting other subject disciplines and to encourage students to consider statistics as a profession. The RSS has extensive experience of providing day school and workshops in this area.

How to set up, run and manage outreach events

According to the NAGTY financial planning regulations each outreach event are ‘not-for-profit’ [8] activities. Not only is the Academy not looking to make a profit but also it expects that event providers will also work on a not-for-profit basis. Procedures for costing and proposing outreach events are as follows:

Step 1 Event provider produces course budget which includes all course costs such as: Planning and delivery, staffing costs, cost per student, course materials, travel, refreshments, venue fees, equipment, risk assessment and any other costs relating to the course.

Step 2 Event provider submits course proposal with costs to the Academy.

Step 3 Approval (Y/N) and Academy agrees to underwrite fees for any shortfall.

Step 4 Students participating charged the full fee, including course costs and 10% Academy administration costs.

It can be seen that a great deal of financial planning and organisation needs to take place before an event can be advertised. The event provider has also to provide the written text so that the Academy can advertise for students. The following website <http://www.warwick.ac.uk/gifted/> gives details of past and present events.

Looking at the research experience from the Education Resource Information Centre (ERIC) [9] “Gifted children are problem solvers. They benefit from working on open-ended, interdisciplinary problems; for example, how to solve a shortage of community resources.” and Painter [10] “Gifted students need educational experiences that match their different ways of learning.” It was clear that a great deal of thought and design of the teaching content of this event needed to take place. The material needed to be presented in a light hearted way to show students that statistics can be fun, different from the normal school mathematics curriculum and intelligently challenging. Since this was the first event of this type for the RSS it was important to have plenty of material at an appropriate level that could be used if required. A common myth of gifted students (ERIC) is that “Gifted students can accomplish anything they put their minds to. All they have to do is apply themselves.” [9] The experience gained from the event supports this theory. The title of the outreach event was ‘Simulations’. It was clear that students found some of the tasks difficult particularly as there were no right or wrong answers. They were fine on the mathematical side of the statistics but when it came down to explaining the solutions it was a different matter. Some of the students could state an answer without being able to explain how they arrived at this answer or indeed what the answer means. This needed to be drawn out from the students and explained fully. The students were encouraged to discuss the mathematical/statistical thinking by which they came to their conclusions. This metacognitive analysis is seen as being very valuable to life long mathematical awareness at a deeper level than just getting the right answer [11]. The event started with a general introduction of the areas to be covered followed by a dynamic interactive group session on the mathematics and statistics required to be able to do the simulation exercises. Students then had the choice of working on various simulation case study exercises. The teaching pedagogy varied throughout the event to meet the needs of the students and it was important that an experienced statistics tutor, who could respond to these needs, was used for this and future events. Thirty students signed up and attended the outreach event. Since this was the first RSS/NAGTY joint venture a member of the NAGTY staff was present to answer any queries and/or questions relating to their organisation could be covered.

An evaluation form was given to each student to complete. Comments from the students were very positive and stated that they had enjoyed the event and would have liked more. 96% stated they would be interested in attending other events about simulations. 75% thought that the programme was challenging or very challenging the rest stated it was about the right level. 93% enjoyed using the RSS building for the event. One comment from a student was "I thoroughly enjoyed the event as I challenged myself and still learnt a lot. I never really liked probability before and still don't, but I like statistics now" [9]. From the RSS perspective it is hoped that these students will stay interested in statistics and hopefully consider a career in this area.

Gifted Research, evaluation and support of educators and parents

The Academy takes ‘the lead in drawing together practice-focused evidence-based research in order to inform national strategies and enhance delivery of its programmes’ [13]. The Academy works closely with the Department for Education and Skills, partner institutions, universities and professional organisations to ensure that its research related and contributes directly to improvement of provision. This includes professional development for teachers and support for parents. The RSS evaluation questionnaire results were sent to the Academy to add to their evidence-based research.

The International Arena

The UK is not the only country to provide activities of this type to gifted students. Other countries such as Australia, Canada, New Zealand and the USA, to name but a few, have mechanisms to support and enrich gifted students learning. For example Purdue University, USA under the ‘Gifted Education Resource Institute’ advertise super summer programmes where “Classes are fast-paced and interactive, and you'll find friends who share your interests and love of learning. You'll also enjoy a wide variety of fun summer activities” [14], New Zealand has many on line resources to use for students and teachers [15], Canada has an Open Mathematics Challenge [16] “to motivated younger students who have done some enrichment study beyond their school year” and Australia [11] has a ‘Virtual School for the Gifted’, which is an online school that specialises in providing enrichment courses to complement and extend able students learning from Australia and overseas.

Statistics from the Data Analysis and Progress Reporting Division, Illinois State Board of Education clearly show a demand for provision for gifted students. [17]

Gifted Students in Illinois by Gender

	Number of Gifted Students	Percent of Gifted Students	State Total	State Percent
Female	86,778	52.6	1,011,239	48.5
Male	78,151	47.4	1,072,948	51.5
Total	164,929		2,084,187	

Gifted Students in Illinois by Grade Level

	Number of Gifted Students	Percent of Gifted Students
K	1,463	0.9
First	5,170	3.1
Second	7,823	4.7
Third	12,092	7.3
Fourth	13,104	7.9
Fifth	13,951	8.5
Sixth	14,895	9.0
Seventh	15,843	9.6
Eighth	16,261	9.9
Ninth	13,325	8.1
Tenth	14,051	8.5
Eleventh	12,218	10.4
Twelfth	19,688	11.9
Ungraded	45	0.01
Total	164,929	

Summary

This paper has looked at and elucidated the following areas:

- (i) To explain the rationale behind the UK Government involvement and funding strategy for a National Academy for NAGTY;
- (ii) Why the Royal Statistical Society decided to become involved
- (iii) How to set up and successfully manage events for outreach programmes
- (iv) The international scene regarding gifted students.

Feedback from the 11-15 year old participants and the Academy suggests that there is a definite demand for similar events. The RSS plan to continue to do more of this type of work and to add it to its education portfolio of provision for students. In addition the ESG aims to develop yet stronger outreach to students at all levels,

building on existing activities such as education workshops, RSS school lectures and the associate schools and college scheme.

References

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