

A NATIONAL SCHOOLS STATISTICS COMPETITION

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Background to the Competition and Its History in the United Kingdom

The Annual Statistics Prize for Schools and Colleges of Further Education was established as a direct result of my hearing of a similar Hungarian initiative when I attended ICOTS I in 1982. The United Kingdom competition has now completed its third year, and the structure of the Competition and its organisation have had time to evolve.

An entry to the Competition must take the form of a report of an applied statistics project planned and executed by a team of pupils. This year, prizes of £350 were presented to the winner in each of three age-groups; 9+ to 13 years, 13+ to 16 years, and 16+ to 19 years.

In the United Kingdom, the Statistics Prize is one of many school competitions catering for a wide range of disciplines and types of pupil. It therefore vies for interest in the schools and also among potential sponsors. The Statistics Prize is a fairly modestly funded operation, its total annual budget being in the order of £2000.

In the three years since its inception, the Competition has attracted sponsorship from computer firms, banks and insurance companies, professional statisticians' organisations, and the government. As well as these sources of finance, the Competition relies on the voluntary help given by adjudicators, various sources of clerical and secretarial assistance, and the services of regional educational administration networks for publicising the Competition. Generally, advertising has to be through such intermediaries because the level of sponsorship precludes both direct mail-shots and also extensive media advertising.

The Competition started out with prizes awarded in two age-groups; 11-16 years and 16-19 years. However, entries from the youngest children were of a different quality and character, depending more on intuitive statistical reasoning than on formally taught analytical techniques. Wishing to encourage such entries further, the Competition has now three age-groups which are separately adjudicated; 9+ to 13, 13+ to 16, and 16+ to 19 years, thus extending the Competition to upper junior as well as secondary schools and colleges. This change has been rewarded by increasing numbers of interesting entries from the youngest age-group teams.

The 1985/6 Competition

Projects were submitted on a wide range of topics, and it was clear that many had involved collaboration between pupils and students of widely dif-

fering abilities and interests. Much of the work was of a very high standard, demonstrating the inventiveness, resourcefulness and logical reasoning powers of these young researchers who tackled "real-world" problems of considerable complexity and significance. Some of the entries from the youngest pupils involved collaboration between particularly large groups, which was an achievement in itself. Most of the projects could be described as cross-disciplinary. Many involved extra-mural activities including work experience and contact with local employers. An increase in the use of the computer as a statistical resource has been noted.

The projects submitted included research projects on dental care; health and nutrition, transport, accidents and road congestion; sexism; media studies and viewing habits; policy research on energy consumption; market research; origins of language; extra-sensory perception; reaction times; chemical research into alloys; ecology; left-handedness. There was a preponderance of survey work, but not to the exclusion of some interesting experimental studies and simulations.

No specific guidelines were given to define the extent of teachers' involvement in their pupils' projects. The adjudicators welcome the fact that most entries are pupil- rather than teacher-oriented.

The 1985/6 Winners

As part of their geography work, twenty-six pupils all aged 10 to 11, from Bar Hill Community Primary School in Cambridge, carried out a questionnaire survey of 800 local residents on matters relating to their village community. Their results are based on the answers obtained from just short of 600 respondents. Contrary to some media criticisms, they found that Bar Hill is a popular village with a thriving community spirit. Some of the team members have now started work extending the focus of their research to other districts by way of comparison.

Nine 12 and 13 year old pupils, from Fairfield High School in Widnes, undertook a project entitled "Subject Options and the Influence of Sex on Choice". The project team designed a questionnaire and administered it to approximately 250 fourth and fifth form pupils. Irrespective of respondents' ability, and contrary to expressed attitudes of equality, the project team found that there was a sex-bias in the choice of school subjects. Pressures to conform to stereotype seemed to come from parents and friends, but teachers were also found to be culpable.

In the top age-group, seven 16 and 17 year olds, from Stourport-on-Severn High School in Worcestershire, investigated attitudes towards drinking and the actual drinking habits of sixth form pupils. Their questionnaire survey found that most sixth formers drink, even though under the age of 18 years. Indeed, some seemed to drink sufficient quantities of alcohol to put them in the category of "having a drink problem". Extrapolating from their survey findings on drinking habits, the team planned and budgeted for a party, enabling reported drinking habits to be checked against those observed in practice.

The Impact of the Competition

Feedback from schools and colleges involved in the Statistics Prize indicates that the Competition is very beneficial to pupils and teachers alike, and that it is having a real impact on the way statistics is taught and learnt. Many project tutors have commented on the real benefits of collaboration in practical research to their students. Furthermore, some report changes in their own understanding of statistics, and beneficial changes in their own, and colleagues', teaching methods. Some projects have resulted in changes to pupils' environments, e.g., energy conservation measures introduced as a result of one junior school team's proposals following their investigations into fuel usage in their school.

Problems and Misconceptions

The Statistics Prize provides the opportunity to influence statistical education by feeding criticisms back to schools and teachers of statistics. For example, some project teams are over-ambitious in their choice of topic, failing to select project aims to fit the research resources available. At the other end of the spectrum, some projects focus on rather trivial, or "well-trodden" topics. Credit is given to projects which display originality, provided they also demonstrate a clear purpose and utility in the research undertaken.

Clearly, pupils do find it difficult to define project aims operationally. The adjudicators were critical of projects which were wholly comprised of data presentation. They favoured work which showed that the project team had given adequate thought to their research design, and to the critical evaluation of their results, showing that they had considered the validity, reliability and efficiency of their research.

The adjudicators would like to see more projects in which the applicability of the statistical techniques themselves is evaluated. Many project teams appeared to apply statistical techniques with a precipitous disregard to the data's underlying characteristics. An obvious example of this would be the unquestioning and automatic computation of arithmetic means to represent small samples of heterogeneous or skewed data, or data with extreme outliers.

The type of collaboration varies considerably. The adjudicators favour those projects which show that full use has been made of the team's resources, and that individual pupils' contributions have been fully integrated into the submitted project.

Future Plans

The Competition has attracted interest overseas and it is anticipated that next year there will be some entries from schools in America. Again there will be three age-groups adjudicated. As a new innovation, it is hoped to offer an additional prize for the project making the best use of a computer.

Here, appropriateness, efficiency and originality will all be taken into consideration.

The numbers of schools taking part has grown over the years. This partly depends on the penetration of the advertising but also on whether schools' reluctance to take part can be overcome. In the early years, it was clear that some schools were "shy" of taking part, wrongly assuming that projects had to demonstrate a level of statistical "sophistication" beyond that of their pupils. Changing the nature of the publicity and the age-grouping of the Competition has helped to overcome such misconceptions and give schools more confidence in their ability to enter. Interestingly, the value of the prize does not seem to be a key factor. Increasing the prize money half-way through the second year had no effect on the number of entries that year. Much more influential is the prestige that a school gains by success in a competition of this kind.

It is expected that experience built up over the past three years should lead to a big increase in the number of entries in 1986/7. It is also hoped that there will be increased numbers of entries based on historical research, physics, and music and the arts, etc., curriculum areas which have so far been under-represented.

Maybe, as I was in 1982, others will be encouraged by this account of a national initiative to establish similar competitions in other parts of the world. Eventually, it might be possible to hold an international Final for the national winners.