Report on organizing the ROSE survey in Scotland

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September 2006

1. **ROSE team**

Professor Alan Roach and Moira Finlayson are handling the ROSE data. Stuart Farmer of Robert Gordon's College in Aberdeen and Bob Kibble of the University of Edinburgh have also participated in the analysis of results.

2. School system and science teaching

Schooling in Scotland starts at age 5 and is compulsory until the age of 16. The first 7 years are spent in Primary education, followed by up to 6 years in Secondary schools. The curriculum for the first nine years of education is organised under a number of themes through a progression of six levels, labelled A to F. One of these themes is titled Environmental Studies, and this embeds Science as one of its three major strands. Throughout these 9 years all pupils follow the same curriculum, though there will be individual differences in progression through the levels.
Most pupils attend state funded primary and secondary schools but there is a small independent fee-paying sector, which is represented by 7 schools in our survey.

Our survey has been directed towards pupils in their third year of Secondary (S3), which is the first year of study where pupils take different subject combinations dependent on choice and ability. Subject courses from this point on are in general offered at two different levels of difficulty. Courses at this stage are designed to be taught over 2 years, and are subject to nationally set examinations taken towards the end of the S4 year. Most schools follow long established 'Standard Grade' courses (SG), with the more demanding curricula examined at levels labelled 'Credit / General', with the lower level curricula at 'Foundation / General'. There are four different subject courses in science: specialist Physics, Chemistry and Biology courses are offered, though only at Credit / General level, alongside a multi-disciplinary 'Science' course, with almost all of its pupils following the lower level Foundation / General track.

In the 1999/2000 year new curricula were launched in Scotland primarily for the S5 and S6 years, with S5 subject courses provided at three levels, Intermediate 1 (Int1), Intermediate 2 (Int2) and Higher. The lowest of these, Int1, was targeted at an achievement level comparable to 'General', whilst the Int2 course paralleled 'Credit'. The Higher course advances beyond Credit with an examination set at what is recognised as the standard university entrance level for Scotland. In a significant minority of schools the more recently designed Int1 and Int2 courses have been adopted in place of Standard Grade for teaching science subjects over S3 and S4. These courses are only available in the specialist subjects, namely Physics, Chemistry and Biology.
Almost all pupils in Scotland take at least one science course over the S3 and S4 years. Approximately 26.5% take two science subjects, and a small fraction, around 3.3%, take three. Our survey collects information from each pupil on his or her choices, and on the level of curriculum being followed.
Pupils were surveyed half way through their S3 year. Their subject selection at this point should be expected to reflect their progress and interests towards the end of their previous nine years under a common curriculum.

3. **Translation**

Although the ROSE instrument was developed in Norway, the original version was in English and so no translation was necessary.

4. National questions

No national questions were added to the main questionnaire but on the front page we asked what science subjects a pupil was studying and at what level the subject was being studied. We also added a further section at the end where we asked the pupil "How I feel about Science in school"
The nine questions asked were:

K01	In science I would rather learn a lot about fewer topics than a little about a lot of different topics
K02	Doing practical and experimental work helps me to understand science topics
K03	Doing practical and experimental work with good modern apparatus makes me want to study science
K04	My school science rooms are exciting places in which to work
K05	If the practical content of the course were increased it would give me a greater enjoyment of science
K06	I found science at Primary School interesting
K07	Science at Primary School prepared me well for science classes in Secondary School
K08	I find science in Secondary School more interesting than science in Primary School
K09	What I learned in S1 and S2 science helped me with the science course I now take

5. Piloting

No official piloting was carried out in Scotland although questionnaires were sent first to just three schools to see how pupils reacted to the questionnaire. As the response was satisfactory survey forms were then sent to the other schools.

6. Official permission

As we had been funded by the Scottish Executive (SE) to carry out the survey we did not need to seek official permission. However we did inform all Local Authorities about the questionnaire and included a letter from the SE.

7. Population

We surveyed pupils in the S3 year of schooling and the vast majority of pupils (81.4%) were 14 years of age.

8.Sample and participation

A total of 92 secondary schools participated in the survey, returning an average of 30 valid pupil responses per school. The schools were drawn from 31 of the 32 local authority areas in Scotland. The great majority of Scotland's schools are government financed and are managed through local authorities, but there is also a small independent sector that provided 7 of the schools surveyed.
The remaining 85 schools are from the local authority sector (LA), approaching a quarter of the total of 392 LA secondary schools. These 85 schools account for 25.4% of the total pupil population of the LA sector.
We surveyed two S3 class groups in most participating schools. The total return collected amounts to just over 4% of the entire age group in Scotland's schools.

9. Data collection in schools

Contact with schools was made in a number of ways:
Via a member of the Association for Science Education (ASE)
The Local Authority and by writing to individual Head teachers.

Copies of the questionnaire were printed and a package with the questionnaires, a letter containing instructions on how the questionnaire should be carried out and a short questionnaire for the class teacher was sent to the contact person. A pre-stamped return envelope was also enclosed.
The person taking the science class was the person involved in conducting the survey.
Questionnaires were sent out during the period from November 2005 to February 2006 so that the survey could be carried out at a time that was convenient to the school.
We had set out to get representation from every Local Authority and also to involve the number of schools in each LA that was representative of the total number of pupils. While we did not quite manage this for every LA overall we got a sample that was representative of the population as a whole and we got a good geographical spread and also a good spread with regard to a socioeconomic indicator that is used in Scotland – the % entitlement to free school meals in a school.
A total of 120 schools were asked to participate in the survey with 95 agreeing initially to participate. Of these 95 schools 92 returned completed surveys. A total of 2897 individual replies were received of which 140 had to be rejected.

10. Feedback and experiences

The general comment from teaches was surprise at the length of the questionnaire and the time required for completion. Several however commented on how the pupils really enjoyed completing the questionnaire and they hoped that the results would be put to good use by improving the school science curriculum.

11. Coding (also of the open-ended I question)

The first 150 forms were manually input into the spreadsheet. However as we had a large amount of data we had decided to use electronic scanning for the rest. This did not go as smoothly as expected but after several mishaps the system eventually ran smoothly. Thanks for this are due to our expert Keith Galbraith at the University of Paisley. Before scanning every script was manually inspected to see if it had been completed and to see if it had been taken seriously. If random patterns were observed the forms were discarded. Manual checks on the accuracy of scanning were also carried out. When the Spreadsheet was complete it was checked for wrong and missing numbers.
Overall we were happy with the quality of our data although we suspect that there may be some flippant responses and coding errors still present.

At the end of May 2006 the SPSS file was finalized - with 2731 usable returns

1449 girls
1282 boys
81.4% 14-year-olds, 12% 13-year olds and 6% 15 year-olds. A few 12 year olds participated in the survey as one school was offering an accelerated course to its S2 pupils.

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September 2006.