Abstract
As part of the Valid Analytical Measurement (VAM) programme and in conjunction with Nuffield Science, an organisation involved with vocational and academic qualifications, LGC has developed a proficiency testing (PT) scheme appropriate for pre-university students.

All PT schemes share two key objectives:
• the provision of a regular, objective and independent assessment of the accuracy of analytical laboratory’s results on routine test samples
• the promotion of improvements in the quality (accuracy) of routine analytical data.

In broad terms these are the objectives of the PT scheme organised by LGC for schools and colleges. The students, working in groups, have to determine the concentration of ethanoic acid samples using good laboratory practice. The PT scheme is conducted in a similar manner to PT schemes used by professional analytical chemists and as such
• vialed samples of ethanoic acid are distributed to all participating centres
• the homogeneity and stability of the acid solutions are measured by analysts at LGC
• statistical analysis is performed on the students experimental data and their calculations of the acid concentrations.

In this way, the performance of students in one centre is compared with that of students at the other centres and this information is relayed back to the participating centres.

The PT scheme has been run on two occasions and from teacher’s feedback, the PT scheme is a ‘user friendly’ activity for both students and teachers. Participating centres also receive teachers notes, student information sheets (practical details) and student reporting sheets. In the light of teachers comments, the difficulties encountered by students performing the analysis and the student reports a ‘Guide to Improving Analytical Quality in Chemistry’ has been produced to help students with analytical techniques such as titration.

The PT scheme for schools and colleges runs over an entire school term (approximately 3 months) and so this allows students to perform the analysis when it best fits in with their studies. It provides a friendly analytical challenge for students and, at the same time, it has helped to improve the way in which students perform their measurements.

Slide 1
The Valid Analytical Measurement (VAM) programme is part of the UK National Measurement System (NMS). The Education and Training component of VAM
has one section specifically dealing with pre-university studies. Initially the aim of this component was to provide support materials for a recently introduced applied science course which was assignment based. The assignments need to have vocational relevance. Students are required to meet specified performance criteria but teachers are given flexibility in the way this is achieved.

In discussions with a group of teachers and representatives from the awarding bodies, proficiency testing (PT) schemes were mentioned as part of the requirement for accredited laboratories. Teachers thought this could be used in the applied science course particularly as one of the mandatory modules is entitled ‘Laboratory Safety and Analysis of Samples.’ The pilot PT scheme for schools and colleges was therefore planned with these factors in mind.

**Slide 2**

So what is a PT scheme? A PT scheme is a means of assessing the quality of analytical measurement made in laboratories. The tests are ‘round robin’ exercises. The scheme comprises the regular distribution of homogeneous test materials to participating laboratories for independent tests. The results are returned to the organiser of the scheme who makes an analysis of the results and reports them to all of the participants.

The primary functions of the scheme are:
- to detect shortcomings in participants test procedures
- to provide feedback on any problems encountered.

This is a particularly important function in analytical measurement, which is fraught with practical difficulties and prone to unsuspected errors.

Schools and colleges were invited to take part in a ‘one-round’ PT scheme. The scheme was advertised as a competition and provided an opportunity for students to take part in a friendly analytical challenge.

**Slide 3**

There are number of factors to consider when planning a PT scheme aimed at schools and colleges.

It is advisable to work with a partner when organising a scheme. The PT schemes organised by the VAM Education and Training team, for pre-university students, have been run in conjunction with Nuffield Science (an awarding body responsible for a number of UK science qualifications at the 16-19 year old age range).

It is important to choose an analysis that can be easily performed by the centres participating in the scheme. The analysis chosen, in this instance, was an acid-base titration since most schools and colleges have access to the relevant equipment and the analytical technique (titration) is part of the teaching syllabus.

The sample or test material that is chosen to be analysed must be homogeneous, stable, cheap to produce or purchase, easy to distribute and pose no hazard in transportation or in use.

There are a number of key events in a PT scheme and these have to be scheduled to fit in with your partner and with the schools/colleges participating in the scheme. It is important not to clash with major events in the schools/colleges calendar, e.g. external examinations or school holidays. Also a selection of test