How to assess large groups with the minimal amount of resources but preserving quality

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Abstract

Assessment in education is basically a process by which a student can be measured and, properly used, is a valuable and essential part of any educational system. There are many types of assessments that can be used and the following three types of assessment will be explored in this paper, namely (a) multichoice, (b) group work and (c) presentations. The list is by no means exhaustive but these have been used and tested by the author with large groups to ascertain statistical understanding. The relative advantages and drawbacks are to be elucidated.

Assessment of the three types, listed above, that are to be examined in this paper have been used for some considerable time in educational institutions. Their usefulness in large group situations is the main emphasis here although points and issues raised may also be poignant to smaller groups

1. Introduction

Assessments provide an indication of the students ability at the current moment in time and that any assessment procedure should be both valid and reliable. Validity is the extent to which assessments measure what it is deemed to be measuring. Reliability, of any assessment, requires that the syllabus /concept coverage remains consistent for each cohort. Both these should be taken into account when designing any assessment procedure. Similarly the purpose of the assessment and its subsequent timing is equally important. For example is it diagnostic, formative or summative assessment have direct bearing on the type of assessment to be used. Statistics being a practical subject, by its nature, lends its self to a multitude of assessment types that can be successfully implemented.

2. Types of assessment

Having decided the purpose of the assessment then the type and timing of the assessment can be organised. Each type of assessment needs the relevant and adequate resources to be available. It is no good deciding, for example, to use computerised tests if the appropriate number of computers are not available. The following assessment models all have their relative merits and limitations and care in choosing the most appropriate one is paramount.

(a) Multichoice assessment can be carried out using computerised systems or by traditional pen and paper procedures, the choice depends on the resources available. Computer Assisted Assessment (CAA) can, for this type of assessment, have enormous benefits. The multichoice bank of questions and solutions once set up, are then marked and implemented by the computer. A random factor and time limit can also be introduced so that, if required, no two students get exactly the same questions but all have the same time limit. The initial programming of these tests is very time consuming and a great deal of thought needs to go into the solution options available for the student to choose from. Students, once familiar with the use of computers, like this kind of assessment. The students can use this type assessment as a learning resource to practice on as much as they feel is appropriate, the time

limit may be relaxed for practice purposes. Weaker students are often motivated by being able to work through at their own pace and receiving instant feedback. The more sophisticated packages, of this type, give the student the opportunity of having feedback after each question, to opt to do more questions covering the topic being assessed and in some cases a printout of the questions to take away to work on and/or ask their tutor for advice at the next class. An example of this type of package can be obtained from http://cba.scit.wlv.ac.uk. This package is a Computer Based Assessment (CBA) project carried out at the University of Wolverhampton, England. A range of programs have been produced to replace traditional written tests with computerised versions. Each CBA program is 100% reusable and is designed to write 80,000 different tests. The tests are marked electronically giving the student a printout of their score, the test, their answers and the correct answers. The CBA project has statistics tests covering basic statistics which includes hypothesis tests on the mean and confidence intervals. Thelwall (1999) has assessed this project, from a statistics view point, and his findings were extremely favourable. For other projects using this technique see Hunt and Simonite et al (1998). For manually written tests a template answer sheet can help speed up the process of marking, but it is not practical for large groups, to have different questions to answer.

This type of assessment can be used as (i) a diagnostic tool to ascertain what previous knowledge the students have obtained and hence help plan future classes, (ii) formative tests to aid the students progress through the course and (iii) summative test to check what knowledge and understanding the students have acquired.

The main advantages and disadvantages of this type of assessment are:

- the questions are quick and easy to mark
- reliable
- give instant feedback, as in the case of computerised tests
- a variety of questions are possible and in some cases no two tests for students are the same.
- students can get a profile of their work
- students can work at their own pace
- comprehensive coverage of the syllabus
- time consuming setting up the questions, solutions and linkage
- no graphical presentation work is drawn by the student
- no written work can be assessed
- putting results back into the relevant context or subject domain
- adequate computers must be available for CAA

(b) Group work provides the students with an assessment method that mirrors how statisticians work in practice. The formation of groups can be carried out in one of two ways: either students form their own group or the teacher identifies the group membership. Both of these methods have their own merits and drawbacks. Students who form their own groups tend to choose friends with similar backgrounds and objectives. This may detract from the rich learning experience to be gained by groups formed by students with different approaches to learning. Kelly (1978) advocates that for students the “furthering [of] their social and personal education” is an essential feature of group project work. Diagnostic assessment, in this case, would not really be appropriate.

Teachers can form groups in a variety of ways. It could be done randomly by allocating a number to each student and selecting these numbers from a hat or by using random number tables to select groups. If this method is adapted some useful statistics can be discussed and elucidated during the selection process. One of the most useful methods used is to compose groups by individual student ability. In order to use this technique the method obviously assumes that the teacher knows his/her students . Teachers who have previously used this method recommend that the group contain a mixed ability range otherwise, one may well find that a high flier group or a very weak group often materialises. (Weak groups present problems when—or if—verbal assessment is given.) Another

advantage of a mixed ability group is that the most able students can be used as mentors to the least able. It is well known in educational circles that we learn by doing and by teaching others. Hence the most able students can serve as mentors to enhance their own learning as well as helping their fellow students.

Assessment of groups poses its own particular problems such as do all the students, in the group, get the same grade? Individualised marks can be given to the various members of the group depending on their contribution. Who decides on this mark the teacher or the students concerned? Group work lends itself towards summative assessment, however, that is not to say that formative assessment is not feasible. For large cohorts of students, probably if the later type of assessment is used, then some considerable time needs to be allocated for feedback. Group work coupled with presentations, as an assessment model, provides the students with simulated real life scenarios.

The main advantages and disadvantages of this type of assessment are as follows:

- promotes team work
- more realistic to real life/work
- good for summative assessment
- can reduce volume of marking
- statistics in context can be tested
- written & graphical work can be assessed
- time consuming in terms of teacher time and class time used
- group members may not work well together
- difficult to ascertain who has done the work
- teacher needs to structure teaching and organise the class

(c) Presentations are not a commonly used criteria that is applied in assessment particularly, one of a statistical nature. A structure that the author has developed in the UK highlights certain areas that can be used to assess verbal presentations. One of the main purposes of the presentations is to help students develop and improve their communications skills. Students need to be able to communicate technical or numerical data in everyday life. Students also need to be able to explain and describe statistical methods and results, and this is a skill that is not very often tested in syllabuses or course plans. The structure shown below could be used to assess the non-statistical and statistical aspects of a presentation. The presentation structure considers and awards grades on an equal weighting as follows (each element gets an equal weighting):

a. Relationship to the audience: Appropriate material used, clear message and recommendations that are meaningful.
b. Use of supporting materials and useful aids to communication: Use of appropriate media for demonstration, handouts, etc.
c. Structure: Introduction, middle, summary, and conclusion.
d. Handling questions: Thoughtful and honest responses, appropriateness of answers and convincing arguments.
e. Time Management: Presentation too long, too short, or appropriate.

The relationship to the audience is important since in real life being able to communicate effectively to get point(s) across is an essential skill to have acquired. To be able to display information using appropriate diagrams, graphs, or other such statistical knowledge is a useful technique and should be graded accordingly. Handling questions is a competency students will need to acquire in various aspects of their future studies and beyond and hence should be encouraged. Students will need to be able to manage effectively their own time in many aspects of life, whether it be for a timed examination or presentation.

The drawback with this type of assessment is that personal knowledge of a student's progress can often inhibit the successful marking of the presentation. It is advisable to have, if possible, a team of

graders to provide input on various facets of the assessment structure. This will allow for a wider and much broader opinion and to achieve consistency and consensus between the presentations. Presentations are expensive in terms of assessor's time and tend to be subjective, and students do not always like the idea of standing up in front of their class and teachers. However, a well organised course plan and relaxed atmosphere in the room used for these presentations should help to overcome this. The benefits that can be obtained from this type of assessment far outweigh the disadvantages. By organising students into groups and having group presentations large cohorts of students can be assessed in this way. See Starkings (1997) for further reading on this issue. As with group work this type of assessment is suitable for summative purposes.

The main advantages and disadvantages of this type of assessment are as follows:

- can link this with group work
- marked on the spot
- instant feedback can be given
- verbal skills assessed
- statistics in context can be tested
- understanding of the statistics used can be ascertained
- statistical presentations materials can be assessed
- time must be allocated for the presentations and this can impede teaching time
- marking need different criteria than the traditional assessment methods
- teachers unsure of how to fully utilise this type of assessment to it full potential

3. Summary

This paper has investigated three models of assessment that is both practical and feasible for assessing students ability in statistics. The relevant advantages and disadvantages of each type of assessment is elucidated in a realistic context for large groups. In order that appropriate assessment can be devised the purpose of the assessment must first be determined. The three assessment models are considered as to whether diagnostic, formative or summative assessment procedure is appropriate. References to further reading and resources available are included in the text.

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RESUME

Ce papier examine trois modèles de correction qui sont à la fois pratiques et faisables pour mesurer l'aptitude des étudiants en statistiques. Les avantages et inconvénients associés à chaque type de correction sont illustrés dans le contexte d'un large groupe. II est important d'établir au préalable l'objectif de la correction afin the pouvoir ensuite procéder avec la méthode de correction appropriée. Trio modéles de correction, initial, en cours et final, sont ainsi examinés afin d'établir lequel d'entre ces modéles est le plus approprié.