CREATING AND STRENGTHENING A STATISTICS TEACHING GROUP

R.M. Loynes
University of Sheffield, U.K.

1. Introduction

Many statistics teaching groups have been founded in recent years, and doubtless more will be created in the future; in the great majority of cases at least part of the aim has been to strengthen the contribution of statistics to national development, and in some cases this has been the principal aim. How well such groups function will always depend mainly on the vision and determination of the staff involved, and on other individual matters such as the resources, human and financial, available, but there are also a number of general points that can be made, and this paper represents an attempt to discuss them systematically. It may be useful as a checklist, perhaps especially if those facing the task are relatively inexperienced, but individual circumstances are so variable that it can, of course, only be a general guide.

Matters are discussed under various headings in the remaining sections: they are arranged very roughly in order of importance, and to some extent in the order in which they would need to be discussed, but the fact is that all are important, and ideas would need to be fairly well worked out for most, if not all, of them long before the first students were admitted. Some of the points are rather obvious, but are included for completeness.

2. Objectives

There is a very broad distinction between professional teaching, directed towards a particular section of employment (e.g. official statistics) or towards a particular type of statistics (e.g. demography), and general education, such as that given in universities, the former may naturally be offered either in universities or in special purpose institutions. The distinction is important, since it will determine the type of student, their previous experience, their motivation, and so on: in the former case one may be guaranteed a steady flow of students, paid for by the employer, whereas this is not usually so in the latter situation.

The choice between these two broad alternatives will probably already have been made by the time the decision to start a group is taken, but the details, which should include if relevant (a) the levels to be taught (b) the kind of programme to be offered (single major in statistics, joint major in statistics and mathematics or economics, etc.) (c) the types of students to be recruited (d) estimates of numbers of students at various stages for each of the first 5 years, also need to be decided. There is no reason why a group should not have more than one aim, though it is clearly better to do a small number of things well rather than a larger number poorly.

There are other activities in which a group can (often) take part: service teaching for other subjects, departmental-based research, and consulting and/or cooperative research. The first of these can only be done if resources permit, but (unless perhaps the teaching staff are part-time working statisticians) some consulting or research on applied statistics is essential in order to keep teachers in contact with the real problems of statistics.

3. Administrative Structure

A separate institute will have a rather simple structure, presumably, but universities are more complicated. In most cases they are organised into Faculties or Schools, which are normally divided into Departments: where should a statistics group be placed in this? Statistics has most commonly been associated with mathematics, in the Faculty of (Pure) Science, which has the advantage of allowing Probability Theory a natural home and of encouraging those students who are strong mathematically to study statistics. In many universities it has been in the Faculty of Social Sciences, however, which has the advantage of putting it closer to its applications and of allowing dual degrees with Economics or with Geography and so on to be easily organised. It may be possible to get (some of) the best of both worlds by making the statistics group a member of both faculties. Whether the statistics group forms a separate department will depend to some extent on its size, but in any case, in order to avoid conflicts of interests, it ought to have a formal existence, recognised by the university and faculties, rather than be merely an informal grouping within, say, mathematics.

Where professional (directed) training is concerned a separate institute seems preferable: one may be able to arrange in a university context for this to be outside the faculty structure, possibly in parallel with a conventional department, with some staff having appointments in both.

4. Reporting and Advisory Questions

Even if the aim is a general educational one, the fact that statistics is in the end to be applied to something means that there are advantages in involving outsiders in overseeing the work of the department in an advisory capacity. Thus it would generally seem valuable to have an Advisory Committee, to meet at least once a year, which has as members (some of) the teaching staff and also representatives of the eventual users of the graduates – the Chief Government Statistician and a senior Industrial Statistician for example. There is much sense too in having an experienced (teaching) statistician from another university as a Permanent Adviser on the Committee, if necessary from another country; a number of countries formerly under British influence still retain the External Examiner system, and the same person could well fill both roles.

Whether or not such a Committee is set up, the preparation of an annual report, with its dual function of encouraging an answer to the question of how well the group is succeeding and, by circulating it, of achieving some publicity, is to be recommended.

5. Staff and Staff Development

Staff being the most important resource of all, it is essential that staffing policy is properly thought out.

Recruitment of staff with the appropriate skills and a commitment to the group's well-being is the first need, and may sometimes be difficult.

Newly appointed staff, particularly younger members, ought to be given an introduction to the institution itself, and also an introduction to the basic skills of lecturing and, an often neglected area, examining. It is sensible to arrange for new junior staff to be attached to a senior member as a kind of apprentice while attitudes and skills are learnt.

Continuing staff development is also crucial. Those who do not already have a Ph.D. are normally encouraged to go elsewhere for such training; this should be monitored carefully, with regular reports expected. But apart from this staff ought to be encouraged to do research, to take leave on a planned basis, to attend conferences, and to be members of relevant societies.

Finally, there should be a well-defined system for promotion, which considers fairly an individual's contribution to teaching, research, administration and commitment to the welfare of the department, and consulting or other contributions to the profession itself.

6. Programme

The curriculum depends so much on local conditions, such as the number of hours available for lectures in a year for the major subject, on students' background on entry, and on the exact needs perceived, that only very general remarks are possible. There are innumerable programmes already in existence at the various universities and similar institutions throughout the world, and details are generally available to anyone who asks for them; it is perhaps surprising that little has been published discussing the possibilities (see however ECA (1986)). Anyone constructing a programme ought to consider carefully (a) how much mathematics is necessary, and how and by whom it will be taught (b) how and by whom computing will be taught (c) whether economics ought not to be in the programme at least to some extent, and (d) whether the programme is realistic in relation to students' previous attainments. Statistics is an applied subject in the end, and some form of practical training is necessary: see Anderson and Loynes (1986 and 1987).

In connection with (d) above, and with the teaching of practical statistical skills, the fact is that although students need technical knowledge, this is of little value if it is achieved largely by rote learning and if it leads only to the solution of stereotyped problems: the prime need is for independent thought, and the programme content should if necessary be cut back in order to allow time for thought.

Standards, particularly in a university, are always being discussed. It is right to aim at parity with other comparable institutions, though realism is necessary at least off the record: it is not very useful to have high standards if this requires that almost all students fail every year, and neither is it very sensible to expect to achieve the same standard of degree for students with only three or four years of secondary education as others manage for students with seven or eight years.

7. Equipment

(a) Computers. The use of computers by working statisticians, even in the poorest countries, is widespread, and will surely be universal within a very few years. Students specialising in statistics therefore need relatively free access to a computer – i.e. individually or in small groups for a few hours a week – to become accustomed to their use. A mainframe machine is more powerful, but unless it belongs to the statistics group mini- or micro-computers under the sole control of the statistics group are probably more useful; in either case sufficient power for student needs has to be planned for, as well as for staff consulting and research needs.

(b) Books and Journals. Both senior students and staff need access to the main journals; books, too, are obvious requirements.

8. Continuing Development

It is important not to think of the considerations above as being needed only once: a group needs to ask itself, or to be asked, rather formally at regular intervals – perhaps five or seven years – how well it has succeeded in its aims and whether these need changing or supplementing.

References

Anderson, C.W., & Loynes, R.M. (1987). University statistics – What are we trying to teach and how? Proceedings of ICOTS II. Victoria, Canada.

Anderson, C.W., & Loynes, R.M. (1987). The teaching of statistical practice. Wiley.

ECA (1986). Guide syllabus at professional level for statistical training program for Africa. Addis Ababa: United Nations Economic Commission for Africa (Statistics Division).