From **Brunelli, Lina & Cicchitelli, Giuseppe (editors). Proceedings of the First Scientific Meeting (of the IASE).** Università di Perugia (Italy), 1994. Pages 337-342.

STATISTICAL EDUCATION PROGRAMME IN PAKISTAN

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1. Syllabuses and examinations

In Pakistan examinations are governed by the relevant University, in Kinnards' case the University of the Punjab. Although this is very similar to what happens in many developed countries the way in which the examination questions are written and assessed is extremely different. The University of the Punjab is concerned that the existing syllabuses were formulated in 1962 and very few attempts to update the syllabi during the last few decades have been attempted. Those modifications that have been proposed (University of the Punjab, 1993) "were abandoned due to some technicalities".

The existing courses in statistics are subject to certain criticism from the University advisors namely:

(i) The courses seem to be lacking in coordination and the students do not fully develop statistical concepts.
(ii) The courses do not appear to be well structured and organised, in relation to the objectives of the syllabus.
(iii) The courses are not only weak in content but are also uneven in distribution of the topics.
(iv) Statistical inference which should form the major portion of the course is not given due importance. It is introduced sufficiently late and most of the teachers cover it hastily.
(v) They provide little insight into the variety and usefulness of statistics.
(vi) They are too technique oriented which over-emphasises computations and under-emphasises the fundamental ideas underlying the statistical reasoning.
(vii) They fail to differentiate between random and non-random phenomena.
(viii) They fail to cope with growing developments in data analysis.

It was felt that there was a genuine need to revise the curriculum and this revision has been undertaken in the light of comments received from

various educational institutions, working teachers and educational policy. Habibullah (1992) stated that "The prevalent scheme for examinations in statistics does not provide a real test of the students' ability. The questions set in the theory papers are conducive for rote learning to a considerable extent, and the requirement that the students should attempt five questions out of ten allows too much choice".

Statistics is essentially a practical subject and the syllabus should be altered and designed in such a way as to introduce the concepts and methods required to achieve the aims and objectives of teaching the subject and enable students to develop a better understanding of the subject. For the first time a statistics practical is to be carried out as part of the examination with a 15 per cent weighting. Although this is a major step for Pakistan examinations these practicals are very much, at the present moment in time, prescribed (University of the Punjab, 1993).

"The Practical Examination will be carried out in laboratories with the help of coins, dice, cards, random number tables and other such materials. A minimum of 20 practicals should be carried out".

The content of each section is then stated for example (University of the Punjab, 1993): "Between 50 and 100 hundred observations to be obtained from experiments. Various measures of central tendency and of dispersion are to be calculated".

Statistics teachers in the country are finding it very difficult to carry out these practicals since they involve a considerable amount of time; resources such as dice, coins, balls and other such relevant materials are in short supply; the teachers feel they do not have adequate experience in carrying out and assessing this type of work; and that there is a need to teach statistical methods in real life as opposed to just techniques. Association with other countries who are familiar with this type of work is essential for Pakistan statistical education to develop.

The students also sit 2 written papers and the questions are very much calculation oriented. A typical question is of the form stating some values, not always put in context and calculate some statistical measure, an example from Beg and Mirza (1989) is:

> "The reciprocals of certain values of X are 0.004, 0.0625, 0.05, 0.025, 0.02, 0.125, 0.333, 0.0125. Find the arithmetic mean of X".

This type of question is also used throughout the students time studying statistics. A broad statistics curriculum is not only desirable but essential since students do not learn by having facts hammered into them and rote learning of how to answer questions. Pinder (1987) suggests that: "Most rote learning unless accompanied by understanding, does not

remain in the memory. To be retained learning must be understood, and skills practised in a variety of ways".

Howe (1984) states that: "The mental activities of individual students form a powerful source of influence on what is actually learned".

It is essential that the statistics syllabuses, curriculum and examinations are altered in such a way as to provide students with a forum for applying and understanding statistics in a variety of contexts.

2. Statistics Teacher Education Programme (STEP)

This programme was launched in the early part of 1992 and so far 3 training sessions have taken place. Kinnard College statistics teachers were the inauguration team which set up the training programme and provide support to other statistics teachers. Each session has focused on a particular element of statistics. The STEP 3 session concentrated on how to devise, conduct and assess statistics practicals. Before any decision is to be made on how to proceed areas of concern need to be looked at. The points listed below are of more global issues central to statistics in general rather than just to the practicals. Areas of concern raised are:

(i) teachers apparent lack of interest and attitude problems;
(ii) lessons tend to be examination oriented and some teachers only teach between 7 to 10 topics out of the 10 that come up on the examination paper;
(iii) there is a basic weakness in the students to be able to perform this type of work: they are used to routine calculations;
(iv) private tuition work has increased and is seen as a social status and a matter of prestige among students and parents. Hence some teachers will not cover all topics but leave these areas to the private tuition classes, often run by the same teacher. A teacher's salary, in Pakistan, is very low and not enough to support a family. Thompson (1973) reiterates this by saying that: "Local conditions produce quite distinct difficulties and opportunities". Home tuition is essential to maintain a reasonable standard of living;
(v) students prefer to do numerical rather than practical questions since they can achieve full mark;
(vi) students have to answer all questions in English but their first language is Urdu;
(vii) collecting data in real life situations can cause problems particularly for female students in Pakistan. Thompson (1973) also mentions: "Cultural problems are mixed up with social ones".

Teachers at the STEP 3 programme made various suggestions to help

solve some of their problems. They suggested that the examination system needs to be changed so that more emphasis be placed on practical elements, refresher courses and workshops for existing teachers should be available, changes need to be made to initial teacher training courses and a reasonable salary be paid to teachers so that private tuition is no longer essential to life and hopefully corruption can be eliminated. Starkings (1992) states: "Statistics in educational terms is relatively new and it appears that in education the needs of the students always seem to supersede the presence of suitably qualified and experienced staff who are ready to teach".

The STEP 3 session concentrated on identifying and trying to find ways of solving the above areas of concern.

3. Annual statistics competition

At Kinnaird College a considerable amount of progress has been made over the last few years to try and bring into statistics a practical element. This has been partly achieved by the Inter Collegiate Statistical Competition. The rules of the competition can be summarised as follows:

1. Students may participate this competition either individually or in the form of teams of either 2 or 3 students of the same college;

2. Each student/team should carry out a statistical project as follows:

a) Decide what is it that you want to find out (for example you may wish to get an idea regarding the proportion of students who take tuition);
b) Collect primary data (real, unpublished data) in order to find a reasonable answer to your question;
c) Analyse the collected data and draw a conclusion; state the limits of your conclusion;
d) Present your project in the form of an attractive poster.

It should be noted that tuition in this context means that a student has private tuition in addition to their normal college lessons. Students of Kinnaird College were not allowed to enter the competition since it was felt that the host college should be neutral.

This is the third year of running this type of competition. The first year had only 2 entries from one college, the second had 135 entries from most of the colleges in Lahore and this year 105 entries were from colleges throughout Pakistan. Although the number of entries was less the coverage of the country was far greater. This was largely due to the tireless

effort of the statistics department at Kinnaird College. The entries varied in type of survey carried out. Example titles were "Population of Family re: Education Level", "Why do people take exercise", "Liking or Disliking of Dish Antenna", "Crank Calls", "Smoking and Spirits", "On what basis do people cast vote", to name but a few.

It is surprising how many of the topics appeared to be very western in nature. The competition was on display for teachers and students of any college to come and visit. Several colleges visited with their students and obtained useful ideas to enhance their teaching and to promote further interest in the annual competition. The competition posters are now to be sent to any college in Pakistan that requests them to be displayed. It is hoped that this will encourage many more students to enter the competition in future years. Examples of positive comments taken on the day are 'the competition is both educational and interesting, it brings practical confidence in participants', 'the exhibition is very good attempt and I think it should be continued so that other new coming students can participate in next years competition'. Some problems raised by the teachers are that students have problems defining and applying simple concepts. Present text-books were not really appropriate for teaching practical statistics and that college teachers are not given any training on how to teach. Many statistics teachers reading this may well be in agreement with this in their own country.

Working in an educational system that is predominantly textbook oriented this initiative was to try out new methods for effecting change. The competition certainly has the statistics teachers talking to each other about ways of encouraging their students to be involved in practical work. By providing a forum whereby teachers can discuss ideas and ways of improving their teaching can only be of mutual benefit to the students and the subject progression in Pakistan. It is hoped that this competition will continue to grow and that practical work in statistics will become an integral part of the subject. If this is achieved then the philosophy behind the introduction of the competition will have been fulfilled.

4. Conclusion

There is no panacea for solving the above concerns but help from other countries and international organisations such the ISI and IASE is essential to the growth and future development of statistics in Pakistan. Obviously changes cannot be made overnight and that, although many negative issues have been raised in this paper, there is a considerable amount of good statistics teaching being carried out in Pakistan. Many teachers face

considerable financial hardship by entering the profession and are tireless in their pursuit of educating the students to the best of their ability. The pace of innovation has to be constantly monitored otherwise if it is too rapid teachers may be bewildered by new techniques and ideas behind them. The new developments are exciting and refreshing after the more mechanical and repetitive calculations, with the emphasis placed on practical exercises rather than abstract routines, there is a good chance that statistics will come to help students in their ordinary lives.

Bibliography

Beg A. and Mirza M. (1989), *Introduction to Statistics*, The Caravan Book House Publishing Company, Lahore, Pakistan.

Habibullah S. N. (1992), Statistical Education in Developing Countries, The Pakistani Scene, in L. Pereira-Mendoza (ed.), *Proceedings of the International Statistical Institute's Round Table Conference*, Lennoxville, Canada 1992, International Statistical Institute, Voorburg.

Howe M. (1984), *A Teachers' Guide to the Psychology of Learning*, Basil Blackwell Inc., NewYork, USA.

Pinder R. (1987), *Why don't teachers teach like they used to?*, Hillary Shipman Limited, London.

Starkings S. A. (1992), Introducing Data Analysis in the Schools Who Should Teach It?, in L. Pereira-Mendoza (ed.), *Proceedings of the International Statistical Institute's Round Table Conference*, Lennoxville, Canada 1992, International Statistical Institute, Voorburg.

Thompson B. (1973), *Learning to Teach*, Sedwick & Jackson, London.

University of the Punjab (1993), *Syllabi and Courses of Reading Statistics FA/FSc classes XI and XII intermediate examinations 1993*, University Press, Lahore, Pakistan.