Abstracts and Short Presentation

Changes to Probability and Statistics Curricula in Schools in the 1990s : Implications for Pre-Service and In-Service Teacher Education

John Dowsey - Melbourne, Australia

It is evident that over the past ten years, there has been substantial change to probability and statistics curricula in schools in many countries. It is also clear that there will be continuing development in the 1990s if for no other reason than the continuing impact of technological change.

This paper discusses the evolving situation in Victoria (Australia) related to the incoming VCE (Victorian Certificate of Education) with the particular focus being the need for a review of statistics and methodology courses appropriate for intending secondary teachers. In particular, the state of play in teacher education at the Institute of Education as it relates to the areas of probability and statistics is described. In addition, some comments regarding teacher in-service are made.

Training Teachers to Teach Statistics - Victoria 1988-1990

Kay Lipson - Melbourne, Australia

Major changes to the mathematics courses in Victoria have meant that the amount of probability and statistics being taught in schools will undergo a large and dramatic increase over the next few years. Somewhere around 20-50% of mathematics at Year 11 and 12 (the first two years of secondary school) will now be probability and statistics. Not many teachers currently practising in schools have the expertise to tackle much of the subject matter with confidence and enthusiasm. The result is that there is a need for professional development of teachers, which is both extensive and urgent.

The Statistical Education Unit at the University of Melbourne has endeavoured to meet this need through various strategies, from half-day workshops to more formal courses running three hours weekly over thirteen weeks. These have met with varying success. Our conclusions and recommendations based on these experiences were presented.

Some Teacher Preparation Efforts in the Southeastern US : Strategies, Contents, Observations

M B Ulmer - Spartanburg, South Carolina, USA
M Scott - Gadsden, Alabama, USA

History: In the United States, the topic of deficiency in quantitative literacy among high school graduates has been in the limelight for the past several years. Traditionally, students in US schools have not been taught statistics and probability as a regular course. The situation is particularly disappointing for many regions of the southeastern states which, in some respects, are similar to some of the developing nations around the world. Of the twenty-two states in which at least 42% of the high school graduates took the 1989 Scholastic Aptitude Test (SAT), Florida ranked 14th, Georgia ranked 20th and North Carolina and South Carolina shared the lowest rank on the mathematics portion (The Chronicle of Higher Education, 1989). Results are similar for other nationally normed tests.

An example of the state of concern for quantitative education in the region lies in the following. In a 1988 survey of sixty Alabama high school principals, 29 (49%) indicated they recognised the need for a statistics course but had no personnel trained to teach it, while 24 (40%) indicated they had no interest in teaching statistics. Since that survey, new guidelines for mathematics instruction have been published by the Alabama Department of Education (Bulletin 1989, No 31). These guidelines are based on the Curriculum Standards of the National Council of Teachers of Mathematics (NCTM, 1987) and require that statistics be a part of the curriculum in all grades (K-12). But simply publishing the guidelines did not make the teachers better prepared. So in Alabama, as in the other states, efforts are underway to address the problem. This presentation describes some of those efforts and makes observations about their long-term effectiveness.

Summary of initiatives in teacher preparation: In Alabama, a leadership training programme at the University of Alabama at Birmingham ran for three summers beginning in 1988. In each of the first two summers, forty selected applicants attended six weeks of classes on content and methods in statistics teaching. In 1990, forty of the former participants were selected to learn to conduct small workshops in statistics.

At the University of Alabama Extension Centre in Gadsden an initiative by M Scott consists of full semester statistics courses for area middle and high school teachers who are pursuing a master's degree or enhancement of certification.

Statistics teacher preparation in Georgia and Florida includes workshops such as the Quantitative Literacy and Woodrow Wilson workshops described by others at this conference. These workshops are generally of one or two weeks' duration and emphasise simulation, activity-based cooperative learning, and median-based statistics. They are not intended to produce the results of a full statistics course.

South Carolina efforts are similar to those found in Alabama in that voluntary summer courses predominate. A graduate level semester length course at Winthrop College this summer integrated traditional statistics topics with the median-based statistics of the Quantitative Literacy Series (e.g. Landwehr and Watkins, 1987). The

course is about a 50/50 blend of content and methods instruction.

M B Ulmer's three-hour graduate level semester length course at the University of South Carolina at Spartanburg is designed around a text, now in manuscript, which is intended for eventual use in the middle and high schools. This course is predominantly a content course with one objective being mastery of the contrapositive reasoning needed for understanding hypothesis testing (cf. Rubin and Rosebury, 1988).

Observations: Professionals in business, industry, and education recognise the problem of quantitative illiteracy in the United States. Business and industrial firms are retaining educators to teach employees who did not learn statistics in school (Jobe et al., 1986). Many educators, including those in our region, have begun to address the problem. These efforts appear to be helpful for those who have been reached, but are limited in content coverage and in continuity of effect. Workshops are of short duration and, even if well conceived and well done, may be only marginally helpful to participants with inadequate preparation. They may be viewed as emergency measures to help alleviate the immediate problem. Courses provide more coverage but are taken only by those with enough initiative to participate.

We believe a long-term solution lies in nothing less than modification of requirements for mathematics teacher certification that include minimally the statistics objectives delineated by the NCTM Standards. High school curriculum modification is, in many areas, already underway. This fact necessitates that the short-term efforts, such as those reported here, be continued if we are to have even marginally qualified teachers to teach the new curriculum. But regularly scheduled, required courses in statistics should be a primary goal of teacher education curriculum revision.

References

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