

# Teaching Statistics to Students from a Non-English Speaking Background

Leigh Wood - Sydney, Australia

## 1. Introduction

Australia is a multicultural society. It has an indigenous aboriginal population and welcomes about 130,000 migrants each year. In addition, 25,000 overseas students come each year to study in Australia. Twenty percent of all school students in New South Wales have a first language that is not English. The range of cultures makes Australia a wonderful place to live but can create difficulties for the Anglo-dominated education system. Students need to function in English if they are to succeed in the education system. Statistics teaching can be adapted and enriched by adopting second language techniques in teaching.

Success in statistics requires high levels of literacy in natural English and mathematical English and an ability to translate between the two. Mathematical English is a register of natural English. It has vocabulary and syntax that are related to natural English but are used in a more precise and stylised manner. Mathematical English is the way we communicate mathematical ideas to other mathematicians and to students (Austin and Howson, 1979). Mathematical English is useful, generally precise, and well-known, but mathematical English needs to be *taught*.

Mathematical English, particularly in typed form, is dense (more meaning per square millimetre) and has little redundancy. The words and symbols are precise. The way the words are used (syntax) is often idiosyncratic and ambiguous to the uninitiated. Mathematical English relies often on clues other than the words and symbols. There are visual clues such as graphs and tables of figures. Think of how you would teach the normal distribution to a blind student and you will realise just how much we rely on visual clues.

Reading skills in mathematics are different to natural English. Eye movements are up and down and side to side, needing to comprehend a block as a whole. Writing skills in mathematics are almost non-existent in senior high school and junior tertiary level.

Many teachers are frustrated by the lack of resources for non-English speaking background (NESB) students and often by the difficulties of communication (Dale and Cuevas, 1987, p.10). However, the resources and techniques are widely available. There is a body of techniques from English as a second language (ESL) teaching that can assist statistics teachers. Adapting textbook materials, being aware of language, working with ESL teachers, will increase statistics and language learning for our students.

This paper suggests ways of teaching and adapting materials to help all students, not only those from a non-English speaking background. These techniques are well-known to teachers of English as a second language but not well-known to statistics teachers. Techniques canvassed in this paper include cloze, matching, composition, sequencing, and cooperative logic. The methods are in line with the trend in mathematics education towards small group activities, problem-solving and open-ended activities. For students studying in a second language, however, group work will need to be structured to encourage verbal interaction.

## 2. Language acquisition

Non-English speaking background students will learn English, some quicker and some with less effort than others. We, as teachers, can make learning of language easier by presenting our instruction in ways that help that process.

We learn language skills through interaction, through real situations which force us to observe, to take risks, to *use* language. These situations can be simulated in the classroom by using strategies which encourage verbal interaction between students as well as individual reading and listening tasks. Students need to be encouraged to take risks with language, to experiment with pronunciation, to translate statistics written in natural English to mathematics and *vice versa*, to listen to and read mathematics.

Language teachers divide the task of language acquisition into four macroskills. They are *reading*, *writing*, *listening*, and *speaking*. Teaching methods reflect these four skills. Small group activities are structured to facilitate the development of speaking, listening, and reading skills. Group activities using probability experiments become report writing activities. The use of concrete materials, where appropriate, gives a focus for discussion.

The atmosphere of the class is extremely important. Krasten (1984) states that language will be acquired if the student has sufficient comprehensible input and a low affective filter. Students with low anxiety and no mental blocks caused by an environment perceived as threatening will acquire language. So we need two elements in our teaching, comprehensible input and a supportive environment that will encourage students to develop skills in reading, writing, listening, and speaking.

## 3. Linguistic problems with probability and statistics

In addition to the problems with mathematical English documented in Dale and Cuevas (1987) and Burton (1988), there are problems specific to statistics and probability. These problems exist for native English speakers, but are more extreme for NESB students.









