

A FIRST YEAR STATISTICS PROGRAMME FOR INDIGENOUS AND MIGRANT STUDENTS ARRIVED AT BY CO-OPERATING WITH LOCAL COMMUNITIES AND THE STUDENTS THEMSELVES

Megan Clark

Victoria University, New Zealand

megan.clark@mcs.vuw.ac.nz

A well known dilemma for statistics educators is that while different groups of students learn best in different ways (see for example Cotts, 1994), usually there are only a few instructors for a course operating within tight time and content constraints, especially at first year university level. I will outline a way of partially accommodating the needs of indigenous and migrant students of first year statistics, arrived at by co-operation with the local community and taking their aspirations into account. We also kept in mind what the students themselves wanted from the course and how they planned to use statistics in their lives. Our programme has achieved successful outcomes for many of these students and while we work within a New Zealand framework there are many aspects of our programme that can be adapted in other countries.

INTRODUCTION

For the last 15 years a great deal of my work has been with making statistics more accessible for Maori and Pacific students at all levels of schooling including university (Clark, 1996a). This paper discusses the university statistics experience of indigenous people and 1st, 2nd or 3rd generation migrants within a New Zealand framework, that is, the university statistics experience of New Zealand Maori and students from our near neighbours in the Pacific such as Fiji, Samoa, Tonga, the Cook Islands, The Solomon Islands, Tokelau and Niue. There are lessons in their experience for all of us.

BACKGROUND

In New Zealand Maori are the indigenous people. They make up 14.5% of our population and 20% of the under fifteen year olds (Statistics New Zealand, 1999). They belong to *iwi* or tribes defined by region apart from a growing number of urban Maori who have weaker tribal links. They share a common language and most customs. Maori are also comparatively poor, for example, 20% of the total income of Maori households comes from state benefits compared with 5% of the income of non-Maori households (Te Puni Kokiri, 1997). Pacific students come to New Zealand as economic migrants with English as a second language and others are born here so there are now 2nd and 3rd generation families in which English is the main language of the younger generation. This group makes up approximately 5.5% of the total, it is young and growing. Some issues relating to statistics education are particular to these groups but others are common to many migrant and indigenous communities.

For many Maori and Pacific Nations students in New Zealand, our schools fail them and fail them particularly in mathematics. Young Maori leave school without qualifications at twice the rate of non-Maori (Clark, 1999). They participate at a significantly lower rate in mathematics in senior levels of the curriculum and in national examinations (Davies and Nicoll, 1993). In particular Maori participation in both the two Year 13 mathematics subjects offered in schools is very low, approximately 5% of the candidates each year. This pattern has persisted since at least 1981.

Those Maori studying mathematics in Maori language immersion schools (Kura Kaupapa) are doing better. But 85% Maori are in English language classrooms and this 85% form the bulk of Maori who enter first year statistics at university. In terms of the conventional methods of assessment used in New Zealand, the participation and performance of Pacific students in mathematics is even worse than that of Maori. Compared with all other groups in the community they have the lowest achievement in mathematics on all current conventional measures and are least likely to continue with mathematics beyond the compulsory years. This prevents access to many occupations and professions.

Expectations of these students are low and a common view is this, expressed by a very senior mathematician at my university: “they are not really interested in maths.” This deficit view of Maori and Pacific learners is reflected in typical attempts to improve the situation for these students at university by setting up bridging or foundation courses that we target primarily at Maori and Pacific Nations students, which means of course, that to get a degree it takes an extra year which then costs more i.e., an altogether more difficult undertaking. We persist in using a deficit model when it comes to Maori and Pacific Islands education and continue to see the students as the problem while failing to address defects in the system. This results in our *expectations* of these pupils being far too low.

THE PROGRAMME

I coordinate a large (1100 students) first year mainstream statistics course which is required for psychology, ecology, geography, criminology, social policy, genetics and biomedical science majors. Cotts (1994) identified the following factors as affecting success in first year university statistics courses: sex, major, years at university, mathematical background and learning style (visual, written, auditory, kinaesthetic) to which we might add culture, and whether or not learning in one’s first language (Lorcher, 1989). The constraints of budget and personnel mean that despite the great diversity of students in this course in terms of culture, mathematical background, years away from formal study and learning style we must offer a common series of lectures to all students. However for the last 15 years we have been able to successfully meet the needs of the majority of Pacific and Maori students in this course by offering a programme for them within the weekly tutorial offering.

Prior to this programme these students achieved poorly in the course, for example, the previous pass rate for Pacific students in the course was 50 – 56% compared with the class as a whole pass rate of 75 – 80%. The programme has been successful despite pre-university qualifications being low, e.g., at the time of the inception of the programme over the university as a whole, 68% students had what is called a B Bursary entrance qualification or better while for Pacific students the corresponding figure was 28%. Further the mean mark for Maori in the Year 13 mathematics courses was 8-9% lower than that awarded for non-Maori (Forbes *et al.*, 1996). The pass rate of both these groups in this first year course is now the same as that for non-Maori, non-Pacific students. Crucially we did not impose this programme but began it at the request of local elders in these communities, concerned, not about statistics but with the locking out of their young people from professions such as dentistry, medicine etc. which carry power and prestige in the community. These elders knew what they wanted – a programme, Tagata Pasifika, that was *not* remedial. It was based on a California model that they had read about. The results are interesting in that we have found a lot of previously undetected ability and the shift from a deficit model to an achievement model has been critical.

The course runs at 3 full class 50 minute lectures per week (in streams to fit available lecture rooms) and one 50 minute, small tutorial. Pacific and Maori students are sent a letter inviting them to join the Tagata Pasifika tutorial. The students get the same lectures as everyone else with the option of joining this Maori and Pacific only tutorial. Community radio also advertises the existence of the programme. The tutorial has myself as tutor and either a Maori or Pacific facilitator who is a senior student, ideally a graduate.

This facilitator has multiple roles: they mark assignments, act as a cultural bridge (in the early days to let me know if I was doing anything inappropriate – such as sitting on a desk, act as a reminder if work is not up to date (students have to agree to this), and provider of advice on not just maths but administrative matters as well. They have an office where they can be found. Mostly they are a role model of success.

Language is a sensitive issue. Sometimes on getting the invitation students assume that Tagata Pasifika will be held in Maori or Samoan and if they are poor speakers themselves they may feel guilt or shame and not come. We have learned to make it very clear that the tutorial is held in English.

KEY FACTORS

We have identified several key factors contributing to our success: expectations, cultural misunderstandings, comfort in the class room, long-term commitment, and listening to students – hearing what they want not what we think is good for them.

In New Zealand these students are often not expected to be good at mathematics and statistics which are often seen as part of a Western or Eastern tradition. We start by acknowledging that despite their poor background in mathematics these students are achievers—they have survived high school and emerged with a qualification that allows them to enter university, or they are mature students. So we give no praise for trivial things and set a considerable amount of hard but do-able work. The students are well aware that most teachers at all levels of education tend to have low expectations of them.

Secondly, the programme gives them the option to be one among many rather than one in a sea of pale faces which they dislike. Here is a Maori male telling us how it can feel: “Well it is very intimidating to walk into a lecture room and there might be 100 students there and out of that 100 students, there might be two or three Maori” (Kidman, 1995). Our aim is to make a more comfortable learning environment.

Over the years we have asked our students what is important and often they participate more and perform better in a statistics class they describe as ‘more comfortable’ than usual (Clark, 1996b). In the past (Clark, 1993) many of the students in this first year course, not just migrant and indigenous students have reported a liking for problems and examples relating to their own discipline areas and reflecting the world they live in. We have made a strong effort to accommodate this desire, to the extent of writing our own text (Clark and Randal, 2004) with many examples of data sets provided by senior students at the university operating in the biological sciences and psychology in particular, as well as data from the society we live in. Part of the challenge for us is to provide these comfortable classrooms and a subject that they can feel at home in.

Many Pacific students are more comfortable with a transmission model of teaching (many prefer lectures to tutorials) as this resembles more closely the ways they learnt as a child, and the Tagata Pasifika tutorial is run this way initially. Later in the semester when everyone is more comfortable we shift to a more independent style. Too many intervention programmes try to homogenize Pacific and Maori behaviour in the classroom - try to make the problem group more like the majority. This is not part of our programme.

The tutorial has another purpose – for Maori and Pacific students the general senior high school environment can be difficult with strong peer pressure not to succeed (Hirsh, 1990). Many of these students in order to achieve at secondary school have acquired a habit of solitary study which has enabled them to resist peer pressure. This habit of solitary study which has worked so far makes study more difficult and less comfortable for them than other students who have established networks or form them easily. This behaviour has also been noted with African-American students in the United States by Fullilove and Treisman (1990) among others. A complicating factor is that many Pacific students have been brought up to work together and find extended periods of solitary study uncomfortable (Pacific Islands Students Collective, 1986). We try in the tutorial to provide the foundations of a network which the students learn to make their own if they so wish and realize the benefits of.

Cultural issues can cause big barriers to study. Comparatively few teachers and lecturers in New Zealand are themselves Maori or Pacific and many are unaware of, or misunderstand Maori and Pacific ways. Characteristic behaviours which have been noted in Pacific students (Pacific Islands Students Achievement Collective, 1986) are, for example:

- a reluctance to speak in class,
- a tendency to sit near the back if this is possible,
- a hesitance to approach teachers,
- an ability to ‘evaporate’ in the course of a semester.

These behaviours are often related to factors such as respect for authority, and not speaking unless specially questioned.

Pacific students often have large extended families and family obligations can seriously affect their studies. Like many new migrants, the parents of these students want them to do well

in their studies (Garden, 1984) but families are often unaware that such success requires home backing for study and some quiet time in which to do it. Young women in particular often have considerable demands placed upon them by family e.g., to help at large family gatherings, feasts and funerals.

“While it is enough that boys simply ‘make an appearance’ at family functions, the girls in the family are expected to cook, serve, distribute food, look after children, and take part in the formal proceedings. While young men are more or less allowed to ‘roam’ ...” (Pacific Islands Students Achievement Collective, 1986). These commitments can take many days and cause a student to miss classes or have problems with deadlines for assigned work. When you put this together with a great respect for teachers and professors it can make it difficult for them to approach an instructor to explain their situation. Many university staff are unsympathetic to these cultural demands and this can mean that the student has such a reluctance to approach the instructor that the deadline is not met and the student will simply drop out rather than attempt to explain. We make it very clear at the outset that we understand and respect such commitments and see them as entirely reasonable grounds for an extension.

Other issues relate to attitudes to public questioning – a practice common in mathematics and statistics tutorials. Many Maori and Pacific students will avoid asking questions in class and find the experience of being asked a public question very difficult to handle. Asking a question of the instructor seems disrespectful (it implies that the instructor was less than perfect in their explanation or that the student was not listening with due care) and the public nature of being asked a question can cause feelings of intense shame. “I hate it when they ask you questions. Ma (shame), man. Everyone looks at you. Shriveled, man.” (year 11 student, Samoan) (Jones, 1988).

We do ask questions of course but quietly, on a one-to-one basis which is much easier for the students to cope with. Having an individual speak for a group can also be helpful. Most university instructors and school teachers are unaware of this and take this lack of questions as an indication that students are uninterested or don’t care or are stupid. They may also interpret the more passive classroom behaviour which can be seen in many indigenous groups, such as the Innu of coastal Labrador, as indicative of stupidity or lack of interest.

Critically the programme is there for the long haul – other initiatives in other faculties have come and gone and we are still there. These others almost all failed in their objective and one of the reasons is that students detected a lack of real long term commitment to the goal of giving Maori and Pacific students their rightful place in the university community. These other initiatives were more ‘do – good’ in flavour and often were more for the self esteem of the instructor rather than for the students as well as frequently being based on a deficit model. Having your heart in the right place is not enough.

As well as being successful in terms of student achievement and participation in higher levels there has been an unexpected side effect which I can only call the browning of the department. The Maori and Pacific students we used to have in the past came to lectures and vanished, and all you ever saw hanging around the corridors and making themselves at home were the pakeha (European) and Asian students. Now Maori and Pacific students hang around the place, commandeering empty rooms to study in and generally make themselves at home, pointing I think, to the fact that they now believe the School is just as much ‘their place’ as anyone else’s. This is also visible in lecture rooms where typically they used to sit near the back and be as invisible as possible – now they are in the front or the middle and may stop for a chat as they leave.

CONCLUSIONS

We must raise our expectations of minority pupils. Comfort and high expectations don’t sit easily together in some people’s minds but our Tagata Pasifika group is very clear on this one. Hard do-able work, which is rewarding is what students find comfortable. The *worst* classroom is the ‘remedial’ classroom. It’s uncomfortable, insulting, undermining and limits achievement.

There is still work to do. Many minority students tend to be written off statistically as it is often forgotten that the methods of teaching and assessing statistics evolved from the mathematics taught to a wealthy elite of European boys who were being trained and equipped for leisure not work. We need more assessment options to really give students a chance to show us what they

know. Time and again (Forbes and Mako, 1993) we have been reminded that “Traditional time-constrained pencil and paper tests have proved unreliable indicators of Maori achievement in the past” yet our assessment is still largely a collection of such tasks. (Clark, 1996b). We should do more statistics orally and assess more orally.

It is not widely understood that traditional Maori and Pacific cultures were knowledgeable and skilled in much mathematics. To popularize mathematics and statistics with these groups we need to reclaim it as part of Maori and Pacific heritage. The question for educators is *how* we pass on this mathematical culture to pupils—whether in doing so we *enhance* or damage their existing culture. Pupils learn from education a particular cultural complex called ‘mathematics’ and this cultural function helps to explain the way in which Maori and Pacific Islands students are often not expected to be good at statistics. The worst that can happen to Maori and Pacific Nations students is to succeed at statistics and in the process become alienated from their parent culture. We must teach it in a way that enhances and not damages the cultural background that a student brings to the classroom. Recently we have expanded our efforts to include a tutorial taught in Mandarin to make the subject more accessible to a new wave of migrants from China. This has challenges of its own – the tutorial raises the comfort level of the students but assignments and examinations must be completed in English. The same principles have been applied and this tutorial is proving very popular.

We have considerable data on how successful our programme has been but this assessment of the Tagata Pasifika tutorial from a Tongan student is, for us, the one that matters: “It’s the place for me to be - I’m confident around my own people” (Clark, 1996a).

ACKNOWLEDGMENTS

Grateful acknowledgments are made to all those who shared their knowledge with me and put up with my mistakes. In particular, the initiators of the Pacific Islands Development Programme: Neini Curulala, Sela Taufu, Teura Pokoaiti and Anne-Marie Tupuola, together with the facilitators of the programme: Ezra Jennings-Pedro, Iu’u Tuagulu, Myra McFarland, Lovine Taufu, Inge Renner, Jenny Deben, Roanna Uili and Nathan Thomas.

REFERENCES

- Clark, M. (1993). The effect of context on the teaching of statistics at first year university level. In L. Brunelli and G. Cicchitelli (Eds.), *Proceedings of the First Scientific Meeting of the International Association of Statistics in Education*, (pp. 105 – 109). Italy: University of Perugia.
- Clark, M. (1996a) *The Victoria University of Wellington Pacific Islands Development Programme (Mathematics) 1994*. Higher Education in New Zealand. Occasional Paper Number 3. Syndicate of Educational Development Centres of New Zealand Universities. Wellington. New Zealand.
- Clark, M. (1996b). Mathematics, women and education in New Zealand. In G. Hanna (Ed.), *Towards Gender Equity in Mathematics Education*, (pp. 257-270). Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Clark, M. (1999). Maori and Pacific Islands student performance in mathematics. In A. Else (Ed.), *Exploring Issues in Mathematics Education*. Proceedings of a Research Seminar on Mathematics Education (Year 0 – 6 Students) held at the Ministry of Education on 12 June, (pp. 31 – 39). Wellington, New Zealand: Ministry of Education.
- Clark, M. and Randal, J. (2004). *A First Course in Applied Statistics*. New Zealand: Pearson New Zealand.
- Cotts, J. (1994). Factors Influencing Student Performance in Introductory Statistics at the University Level. Paper presented at the Fourth International Conference on Teaching Statistics, Marrakech, Morocco.
- Davies, L. and Nicoll, K. (1993). *Te Maori i Roto i Nga Mahi Whakaakoranga. Maori in Education*. Wellington, New Zealand: Ministry of Education.
- Forbes, S. and Mako, C. (1993). *Assessment in Education: A diagnostic tool or barrier to progress*. Paper presented to the 1993 World Indigenous Peoples Conference, Wollongong, Australia.

- Forbes, S., Clark, M., Blithe, T. and Chamberlain, M. (1996). The continuing need to monitor gender differences. In C. Keitel (Ed.), *Social Justice and Mathematics Education*, (pp. 258 – 277). Berlin: Freie Universitat.
- Fullilove, R. and Treisman, P. (1990). Mathematics achievement among African American undergraduates at the University of California, Berkeley: An evaluation of the mathematics workshop program. *Journal of Negro Education*, 59(3), 463-478.
- Garden, R. (1984). *Mathematics and Ethnicity*. Report to the New Zealand National IEA Committee. Wellington, New Zealand: Department of Education.
- Hirsh, W. (1990). *A Report on Issues and Factors Relating to Maori Achievement in the Education System*. Wellington, New Zealand: Ministry of Education.
- Jones, A. (1988). Which girls are learning to lose? Gender, class, race in the classroom. *New Zealand Women's Studies Journal*, August.
- Kidman, J. (1995). *Dialogues with Maori Students: Some Implications for Academic Development*. Higher Education in New Zealand. Occasional Paper Number 2. Syndicate of Educational Development Centres of New Zealand Universities. Wellington. New Zealand.
- Lorcher, G. (1989). *Learning Mathematics in a Foreign Language*. Mathematics, Education and Society. Science and Technology Education Document Series. No. 35. Paris: UNESCO.
- Pacific Islands Students Achievement Collective. (1986). *Coconuts begins with a C*. Auckland: Auckland University.
- Statistics New Zealand. (1999). *New Zealand in Profile 1999*.
- Te Puni Kokiri. (1997) *Maori Employment, Income and Expenditure*. Wellington, New Zealand: Te Puni Kokiri.