Education opportunities in collaborative international research programs: experience gained from the Kaapvaal project

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Both industry and tertiary institutions in South Africa have a distinct lack of cultural diversity in the field of Earth sciences. White men dominate the make up of most of the staff at university departments and geological divisions in mining companies. However, in contrast to the USA, the population of white men is less than 10% of the total population of the country. Thus the challenge is not to promote “minority” groups, but improve the involvement of previously disadvantaged groups that make up the majority of the population.

The Kaapvaal project is a multinational, multidisciplinary initiative to study the formation and evolution of the Kaapvaal craton. The cornerstone of the project was the deployment of 50 broadband seismometers throughout southern Africa for a 2-year period from April 1997 to April 1999. A major geochemistry project was launched simultaneously, using the good sampling of the mantle beneath the Kaapvaal craton by kimberlite pipes, to relate the seismic signatures to geological entities.

On the US side the participants are mainly senior scientists and a few PhD students and post-doctoral fellows. In southern Africa a wide variety of students from 3rd year undergraduate to PhD students have been involved. Racial, gender and geographical information about the 33 students whose research in the period 1996-2000 formed part of the Kaapvaal project is given in Appendix 1.

A unique aspect of the project has been the commitment by the South African National Research Foundation (NRF) of R250 000 over 5 years to assist initially 5 (later 3) students to go from 3rd year through to an MSc. This level of commitment is necessary to compete with the company bursary schemes, which tend to prevent students from continuing their studies to higher degrees, as discussed earlier in the document. This funding was initiated by the efforts of Maarten de Wit of UCT, an NRF A1 ranked scientist. Without the efforts of a high profile scientist it is doubtful this level of funding would have been obtained in South Africa. This program was termed the “High Flyer” program and was managed by Marian Tredoux at UCT, with major support from the Geophysics Dept at Wits University.

Thirty-three students achieved, or soon will achieve, post-graduate degrees as part of the Kaapvaal project. Twenty-three of these were from southern African countries, and include 3 “High Flyers” in a specially sponsored NRF funded program. The success of the Kaapvaal project in stimulating the development of greater diversity in the area of Earth science research was demonstrated clearly by the programme for the first day of the 5th Kaapvaal meeting, held June 19-21, 2000 in Gaborone, Botswana: of the 8 talks given before the tea break on that morning, 7 were presented by Kaapvaal students, not one of whom was a white male.

In our experience, the following points are essential for the success of an educational component to an international initiative of this kind:
1. Adequate funding must be made available to students already in their undergraduate career, so as to prevent them from having to take bursaries with service contracts from industry. Ideally a mechanism should be put in place which allows for promising black students, with a perceived flair for postgraduate study, to ‘buy back’ time from a commercial sponsor if already committed. However, their own responsibility for ensuing continued funding must be stressed very strongly to the students, perhaps by making funding available as loans initially, which only convert to bursaries once the degree in question is conferred. The MUFF program of the Mellon Foundation might contain interesting analogies in this regard.

2. Student funding should not only cover residential academic expenses and research costs, but should include a travel component which allows for the student (even at undergraduate level) to travel to at least one appropriate local meeting per year. In addition, at least once in the progression from 3rd year to MSc or PhD, the student should travel to the lab of one of the overseas collaborators for a working stint of about 3 months, but not less than 1 month. Communication between the local supervisor and the overseas one must be very clear, and the project well defined. In the case of the Kaapvaal project, funding was split in the following way: the southern African partner supplied the airfare, and the USA institution covered board, food, and all analytical costs.

3. The bursary scheme should be widely and repeatedly advertised, at least 6 months before the start of the project, to maximise the chances of attracting strong candidates. The subject area should be defocused to the maximum, when it comes to recruiting, and candidates in all associated fields should be considered. Special effort should be made to have some of the researchers involved present the planned project in person to students — in the case of the Kaapvaal project, we received no applications other than from those classes to whom we presented the work in person.

4. Members of the academic staff involved in the research must take personal ‘ownership’ of the student program, and close mentoring structures are essential. Students must be based at the same institutions as their supervisors, and in constant contact, or else it seems that they tend to lose focus and chances for dropping out increase.

5. Regular (annual) report-back meetings, where both the scientists and the students present their work are essential. Logistical constraints indicate that these meetings must be held in southern Africa if attendance of students is to be maximised.