The New Pre-Service Training Programme for Science Teachers in Universiti Sains Malaysia.

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Kertas ini menghuraikan suatu Rancangan baru untuk Pendidikan Guru selama empat tahun yang ditawarkan oleh Universiti Sains Malaysia pada masa ini. Sungguhpun matlamat utama Universiti adalah untuk mengeluarkan guru-guru sains yang berkelayakan untuk mengajar sekurang-kurangnya dua mata pelajaran hingga peringkat Tingkatan Enam, Universiti ini ingin juga mengeluarkan guru-guru yang mudah menyesuaikan dirinya untuk mengajar kedua-dua sains iaitu sains tulin dan rampaian sains pada peringkat sekolah menengah. Untuk kecapaian matlamat-matlamat ini dua halangan besar adalah dihadapi dalam Rancangan lama. Halangan-halangan ini diharap boleh diatasi dengan menawarkan Rancangan Ijazah Sarjana Muda Sains (Pendidikan) mulai tahun akademik 1979/79.

Introduction

Until 1978 Universiti Sains Malaysia offered a four-year concurrent academic-cum-professional teacher education programme for the award of B.Sc. (Hons.)/B.A. (Hons.) with Education degree. Commencing this 1978/79 academic session, this four-year programme has been restructured to give greater emphasis to the professional component leading to the degree of B.Sc. (Education) Hons./B.A. (Education) Hons. While the academic component of this programme is taught by the other Schools in the University, the professional component is the responsibility of the Centre for Educational Studies.

Under the unitized system introduced in the 1976/77 session, the professional component now carries 48 units – one unit is generally equivalent to 14 hours of lectures/tutorials – instead of 40 units in the old programme. The total number of units required for the new B.Sc. (Education) Hons. is 142 – 150. The distribution of these 48 professional component units is summarised as follows:

Education Courses	No. of Units
Compulsory foundation courses	26
Teaching Methods Courses (2 subjects)	12
Elective courses	2
Teaching practice (16 weeks)	8
Total	48

In order to pass the professional component a student has to pass at least 44 units, including the 8 units for teaching practice and the 12 units for the teaching methods courses. Furthermore the education student has to major in two teaching subjects selected from Biology, Chemistry, Mathematics and Physics. This requirement enables a Universiti Sains Malaysia B.Sc. (Education) graduate to teach at least two subjects up to Form Six level.

Constraints

Since graduate teachers are usually employed to teach upper secondary classes, the primary aim of Universiti Sains Malaysia is to prepare science teachers who are competent to teach at this level. Our education students are also exposed to the kind of science taught at the lower levels as this enables them to know the science background of their Form Four pupils in order to plan and teach their lessons more realistically and effectively. At the same time we would like to prepare our teachers to be sufficiently versatile to teach both pure and general sciences at upper secondary level.

However, to accomplish all these is not easy in practice, because we face at least two major constraints even after the recent programme restructure. First of all the Science academic component taken by an education student is on the whole, not much different from that of any other science student. In other words, even under the new structure, there are not many science courses which are tailored especially for the education students, and the contents of these courses may or may not be entirely relevant to what they will be teaching in secondary schools. Furthermore the academic courses are all pure science courses and it is not possible for an education student to major in all the three sciences in order to be completely versatile in teaching all types of science curricula in schools. However, to ensure that every education student is conversant with at least two sciences, the ones majoring in one science subject and mathematics are required to take 12 units of a second science.

The other major constraint of course is the time factor. If given sufficient time the science teaching methods courses can enhance the teaching versatility of our students. Methods cannot be divorced from content of subject matter and whatever additional relevant content necessary can be supplemented during methods courses provided sufficient time is made available. Students can then be possibly equipped to teach the pure sciences, general science and even integrated science, if need be. These two constraints were even more acute in the former teacher education programme and the restructuring of the course was partly to help to reduce these contraints.

Science Teaching Methods Courses

The science teaching methods courses are geared to the subjects students major in, i.e. Biology, Chemistry, Physics and Mathematics methods, each given a weightage of 6 units spread over 3 years. Because of the time constraint, these methods courses tend to concentrate on the approaches in teaching the modern pure sciences for Malaysian schools. However, the teaching of General Science and Integrated Science is not entirely neglected. Each methods course is divided into two parts, one in the general aspects of science teaching and the other in the teaching of a specific science subject, with the emphasis on approaches to science teaching so that students can adapt them to teach the various types of sciences. Initially students are acquainted with the whole Malaysian school science curriculum, from primary to Form Six. Portions of the curriculum are assigned to small groups (3 – 4 students) for analysis in terms of content, approach and teacher's role and then discussed in class. Other general aspects covered in the science methods course are lesson planning; laboratory organisation, maintenance and safety; improvisation of teaching resources; use of audio visuals; simple work on glass, metal and wood, organisation of field trips; and review of problems encountered during teaching practice sessions.

One other aspect that our education students are made aware of is the problem of language and the teaching of science in the upper secondary level. Pupils coming to Form 4 would have done Integrated Science for three years and as such they have had training in the use of work-sheets but in the examination they have had only experience in answering objective type questions. Hence, particularly at Form 4, special attention has to be given in the use and the expression of language in the Science lessons that are prepared by our education students bearing in mind the comprehension and understanding of their pupils and their ability to express themselves both orally and in written form.

Part two deals with the approaches in teaching each specific Science, starting off with Integrated Science and progressively moving up to Form Six. Obviously time does not permit detailed study of every topic in the syllabi and therefore topics that are felt to be more difficult or 'tricky' to teach are selected and discussed.

From experience, practical work in Science teaching presents more problems especially to inexperienced teachers. Therefore the Science methods courses also place adequate emphasis on the proper planning of experimental work by the teacher. The student teacher has to decide which experiments can be demonstrated by him and which can be performed by his pupils. He has to evaluate selected experiments critically considering various aspects like the time factor when his pupils perform it, the instructions to be given, the difficulties his pupils may encounter, the important observations his pupils should make, the type of questions that should be asked to enable his pupils to consider each step, the major ideas and concepts his pupils have to learn, and any special implication for safety. From the financial point of view he should consider the cost involved in the consumable items and the purchase of expensive equipment.

In practice the Science teaching methods courses are not confined to within the University time-table. They are continued during teaching practice sessions since the students are guided and supervised by the Science methods lecturers. Students also have opportunities to prepare and try out teaching-learning material either in the schools or back in the University before they actually use them with their classes. The discussion sessions with their supervisors on Saturday mornings during teaching practice periods have been found to be not only useful but vital. It is during these sessions that problems encountered or observed during the week are discussed and possible solutions to them worked out. During teaching practice, students invariably have the opportunity to experience teaching not only Pure Science, but Integrated Science and General Science since there is never enough Pure Science classes in each school to make up their teaching time-tables.

Conclusion

Although the Universiti Sains Malaysia teacher education programme does not specifically emphasize the training of General and Integrated Science teachers, the aim is to produce versatile and adaptable science teacher capable of handling more than one type of science in Malaysian secondary schools. With the introduction of the new B.Sc. (Education) degree programme, some courses in the academic component have been more suitably structured for secondary school science teaching and at the same time, more units are allocated to the professional component and the Science teaching methods courses have had its units increased by 50 per cent. Thus the major constraints to producing more versatile Science teachers by Universiti Sains Malaysia have been overcome to some extent by the introduction of the new B.Sc. (Education) degree programme in the 1978/79 academic session.