

THE BACHELOR OF TEACHING: AN OPPORTUNITY FOR IMPROVING THE PROFESSIONAL EDUCATION OF MATHEMATICS TEACHERS?

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The University of Melbourne is currently restructuring its teacher education programs. A new two year Bachelor of Teaching Degree, which will follow a standard undergraduate degree, will be introduced in 1994. This paper describes factors leading to the proposal of the Degree, gives an outline of its structure, identifies key features which may have an impact on how effectively mathematics teachers are educated into the profession and explores the issue of how they offer opportunities for improving the quality of mathematics teachers.

FACTORS LEADING TO THE DEGREE PROPOSAL

The Institute of Education at the University of Melbourne was created in 1989 by the amalgamation of Melbourne College of Advanced Education (MCAE) with the University of Melbourne and its merger with the University's Faculty of Education. MCAE offered concurrent courses for intending teachers (the three year Diploma of Teaching and the four year B.Ed.) with all discipline based studies taught by its own staff. Both institutions had a Graduate Diploma in Education for intending secondary teachers with an undergraduate degree. These courses produced Australia's largest output of new teachers, but diminishing demand for teachers meant that fewer graduates were finding teaching positions. In addition, MCAE's discipline based teaching appeared to duplicate what was already available in the University prior to amalgamation. These factors, coupled with the desire to raise the quality of students admitted to teacher education and the conviction that the University of Melbourne is "a research-oriented University", all pointed to inevitable changes being made in the structure of teacher education programs. Changes were needed which would:

- eliminate the duplication of undergraduate teaching;
- decrease the number of students engaged in pre-service teacher education, while raising the quality of students entering and concentrating them in areas with greatest potential for employment;
- decrease the staff required for pre-service education, thereby making it possible for greater staff involvement in research and graduate studies.

The Maling/Taylor Report

In December of 1991 Professor J. M. Maling and Sir William Taylor were appointed to advise on a number of issues relating to teacher education within the University of Melbourne and in particular, the Institute of Education. Among the terms of reference were:

- To advise on the direction in which teacher education should evolve ...
- To advise on the most appropriate structure for the Degree of Bachelor of Education, including the relationship between discipline, methods and context instruction.
- To advise on the principal of concurrency in teacher education.
- To advise on ways of strengthening the status of teacher education ...

In their final report, Maling and Taylor (1992) identified the factors signalling changes noted earlier and added that:

- international trends in teacher education "...aim to forge ever closer links with the schools than are possible in concurrent programs";
- there is need for teachers to have *substantial* (our emphasis) discipline knowledge and "pedagogical content knowledge";
- the Institute needs to place emphasis on excellence in research as well as teaching.

Because of these and related factors, they proposed a new pattern of teacher preparation, one in which

"... teachers would enrol for a two year course of study, the first year primarily based in the Institute and the second year mainly school-based, with the student undertaking supervised teaching and educational studies with the assistance of Institute staff and Advanced Skills Teachers from the school."

This recommendation lead to the development of the two year Bachelor of Teaching Degree, which is to be introduced in 1994.

STRUCTURE OF THE PROPOSED DEGREE

Accepting the main recommendations of the Maling/Taylor Report, the Institute of Education published a *Proposal for the Introduction of a Bachelor of Teaching in 1994* (Institute of Education, 1994). This document outlined the course structure for the B.Teach., gave details of subjects and proposed that student enrolments for the period 1994-1999 be:

Year	'94	'95	'96	'97	'98	'99
Number of Students	60	125	180	200	250	250

With no further intake into the B.Ed. Secondary after 1993, these numbers confirm that the B.Teach. is intended to be the predominant mode of teacher education at the University of Melbourne. Current planning sees the retention of the Graduate Diploma in Education only as a part-time course. In order to trial the overall effectiveness of the Degree structure and its components, thirty places are to be offered in 1994 in each of the two years of the Degree. First year students will be graduates with approved degrees for selected secondary teaching areas (Mathematics is one) and second year students will hold a Diploma in Education or equivalent in one of these teaching areas. After this one-off trial, it is intended that there be no progression into the Bachelor of Teaching from the Diploma. *Figure 1* shows the course outline of the proposed B.Teach., with the relative weightings of the subjects indicated by the number of points (one full academic year is 100 points).

FIRST YEAR	
Semester 1	Points (100 points per year)
• School Experience & Practice Teaching 1 (10 + 10 + 10 days)	15
• Language & Literacy in the Classroom	10
• Learning Area Studies 1	5
• Teachers Inquiry & Learning 1	10
• Young People: Developmental Perspectives & Education	10
Semester 2	
• School Experience & Practice Teaching 2 (20 days)	10
• Learning Area Studies 2	20
• Teachers Inquiry and Learning 2	10
• Young People: Social & Cultural Perspectives & Education	10
 SECOND YEAR 	
Semester 1 Strand One	
• School Experience & Practice Teaching 3 (30 days)	15
• Learning Area Studies 3	10
• Selected Studies	25
OR	
Semester 1 Strand Two	
• Internship (60 days)	40
• Learning Area Studies 3	10
Semester 2	
• Internship (60 days)	40
• School-related Project	10

Figure 1

It is intended that the B.Teach. be available to students wishing to be primary or secondary teachers. Intending primary teachers will normally take Strand One in the second year, because they need to use both the Learning Area Studies and the "Selected Studies" slots to obtain a basic grounding in each of the curriculum areas. Intending secondary teachers will be able to choose between Strand One or Strand Two. The offerings for Selected Studies in Strand One will depend on overall student numbers but could eventually include choices of additional discipline studies, reflective courses about mathematics (e.g. a subject examining processes of mathematical thinking), pedagogical knowledge or some building on a student's other strengths (e.g. a LOTE). *Figures 2 and 3* show the proportion of course points given to each subject for the two strands. In Strand One, the "selected studies" will probably contribute to one or more of the other categories,

but in different proportions for different students (e.g. for prospective primary teachers, the selected studies will in fact be learning area studies).

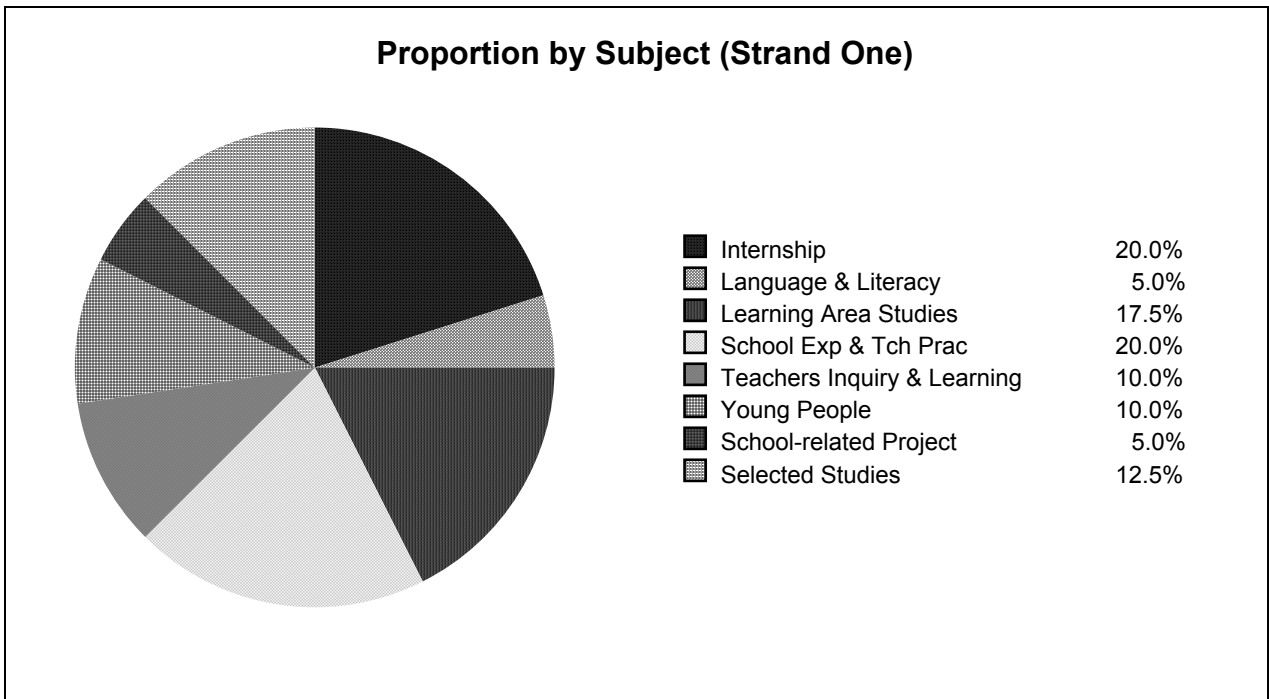


Figure 2

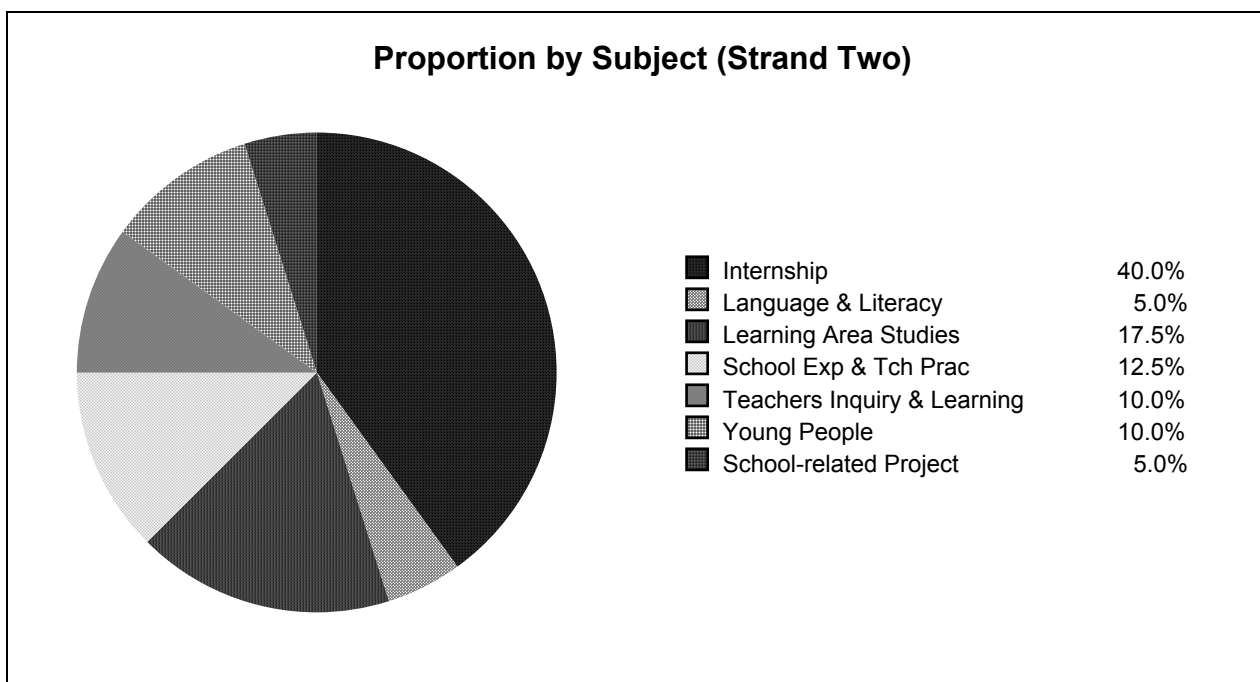


Figure 3

FEATURES LIKELY TO EFFECT QUALITY

Increased time for maths method and curriculum study

In the proposed B.Teach. the only subjects for which mathematics education is ensured complete development and teaching responsibility are the Learning Area Studies 1, 2 and 3. These are specific method and curriculum based subjects. *Table 1* gives the total number of contact hours for this type of subject in the existing B.Ed. Secondary and Dip. Ed. courses as well as for the B.Teach.

Method	Course		
	<i>BEd Secondary</i>	<i>Diploma of Ed</i>	<i>B of Teaching</i>
<i>Single Maths</i>	56 hours	60 hours	70 hours
<i>Double Maths</i>	104 hours	100 hours	140 hours

Table 1

It is evident from *Table 1* that the B.Teach. offers a welcome increase in the number of hours given to methods of teaching mathematics and mathematics curriculum studies. This should make it possible to more adequately develop all the key aspects of mathematics teaching recommended in the *Discipline Review of Teacher Education in Mathematics and Science* (1989), particularly

- ensuring competency in the use of technology essential to the study of mathematics and appropriate for the teaching of mathematics
- providing a comprehensive overview of the K - 12 mathematics curriculum
- providing a level of experience with methodologies and resources for teaching mathematics which is sufficient for the construction of appropriate school mathematics programs.

Students who take a single mathematics and a single science method in the current Dip.Ed. would not receive substantially more curriculum studies if they enrolled instead in B.Teach. However, the enhanced "double method" hours should enable a group of students to delve deeply into curriculum planning and the study of children's mathematical learning.

Extended school practice and internship

The B.Teach. offers extended school practice culminating in an internship in the final year. For many intending secondary teachers (those in Strand Two) 52.5% (170 days) is given to school practice and the internship, and 40% (130 days) for Strand One (including all primary teachers). The number of days in schools is much more than for the current B.Ed. (60 days) and Dip.Ed. (45 days). This aspect of the B.Teach. has potential for establishing closer links between theory and practice and creating useful dialogue between schools and the University, the student, the school supervisor and University mathematics educators. However, it must not be assumed that by simply spending more time in schools that students will necessarily learn and develop the knowledge and skills needed for promoting high quality mathematics learning. Students need time away from the demands of the school, and under the guidance of informed mathematics educators, to share, discuss and reflect on teaching practices observed or used, and to explore alternate teaching strategies, resources and issues. The internship must be well handled for it to result in teachers who are markedly better than those who have a Dip.Ed. and a year of ordinary employment in a school.

Quality of mathematics background

Secondary students selected for the B.Teach. are likely to have a good discipline based knowledge of mathematics, but may lack the school mathematics content knowledge that is vital to successful teaching. (See *Professional Standards for Teaching Mathematics* (1991), pp. 132–143.) In a concurrent course, aspects of mathematics that help students view elementary mathematics from an advanced point of view can be emphasised. When prospective teachers undertake the standard university course, they will study courses designed primarily to meet the demands of other course users (e.g. engineers, computer scientists, scientists). The extended school practice and internship has the potential to provide experiences with school mathematics topics that may lead to deeper

understandings of the subtle ideas and relationships between and among concepts. (See Chazan, 1992).

Users of research and researchers

The research project in final year provides an opportunity for us to begin to develop in teachers an awareness of the contribution of research to effective teaching of mathematics. Student should gain an appreciation of both the strengths and limitations of educational research.

Language in learning mathematics

Specific emphasis is given to the role of language in learning by having a required subject in this area. There may be an opportunity in this subject to draw students' attention to the need for teachers to help children learn to express quantitative ideas clearly.

Mix of primary and secondary

We see the possibility of prospective teachers of primary and secondary schools sharing many classes as a real opportunity to increase the understanding of teachers of the continuum of learning of a child. All B.Teach. students will spend time in both primary and secondary schools. We need to monitor whether the depth to which each group can pursue studies directly related to the nature of children in the years they will work with is limited. Unfortunately the first trial will not have any primary teachers, so this question will remain unresolved for some time.

CONCLUSION

The B.Teach. holds promise for an improvement in the quality of mathematics teachers entering the profession. However, for this promise to be fulfilled effort must be made to ensure that, whenever possible and appropriate, learning arising from course subjects is developed from or related to the specific context of school mathematics and that these subjects provide for teaching contributions by people with recognised expertise in mathematics education.

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