

## Chapter 2

# Medical education

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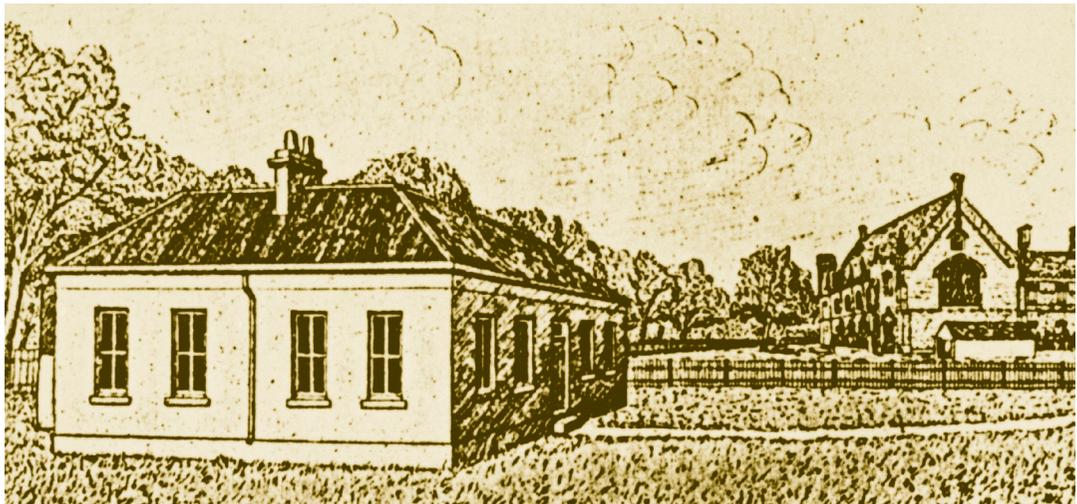
### The medical curriculum before 1970

The basic outline and philosophy of the medical curriculum at the University of Sydney, as noted by John Young, remained similarly structure between 1886 and 1997, moving from basic sciences to clinical work, although the duration varied.

The first curriculum (now lost) was the basis for the examinations carried out by the fledgling Faculty. The second, developed in 1882, was immediately revised by Anderson Stuart on his arrival (the third curriculum) to emphasise anatomy, comparative anatomy and physiology, reflecting his own education. Lectures and extensive practical laboratory work dominated. Details of hospital teaching are not available, although many clinical lectures were delivered. It is likely that time outside of formal classes was spent in clinical clerking and bedside tutorials.

The original conditions for entry to Medicine included the holding of a degree in Arts or Sciences, or as a minimum to have passed Year 1 in Arts. Matriculation requirements included Latin and either Greek, French or German; and three of Arithmetic, Algebra, Geometry, Trigonometry, Surveying or Astronomy. Anticipating concerns of a century later, W C Windeyer tried unsuccessfully in the Senate to have marks in English counted for selection.

Consultation was easy in the small Faculty, with one location on campus and the adjacent Royal Prince Alfred Hospital as its clinical site, although the Botanic Gardens offered teaching space



The first medical school

for *Materia Medica*. One feature of the times was the close attention exercised by the University Senate. Examples include decisions about details of curriculum as well as the number and timing of examinations. With an increasingly complex University, that level of supervision and direction could not persist, no doubt a relief to subsequent deans.

### The third curriculum: 1885–1890

Year 1	Year 2	Year 3	Year 4	Year 5
Arts	Botany <sup>†</sup>	Anatomy <sup>†</sup>	Anatomy	Clinical
	Chemistry <sup>†</sup>	Physiology <sup>†</sup>	Physiology <sup>†</sup>	
	Zoology <sup>†</sup>	Pharmacy <sup>†</sup>	<i>Materia Medica</i>	
	Comparative Anatomy <sup>†</sup>	Surgery		
	Human Anatomy <sup>†</sup>			
		pm: Hospital	pm: Hospital	

<sup>†</sup> required laboratory practical work

Further – but minor – changes followed in 1885 (the fourth curriculum). Even in the earliest days, a conflict between academic and clinical work was noted. The fifth curriculum, from 1890, was relatively stable, although some compression occurred from 1914 to release graduates early for military service. It was revised in 1922 after Anderson Stuart's death, prompted by concerns about the number of annual examinations. They were reduced from five to three. The sixth curriculum, of six years duration and similar to its predecessor, was implemented in 1926. Without changing the basic philosophy or structure, newer subjects (e.g. biochemistry and pharmacology) were later accommodated. It essentially lasted until the 1970s.



Dissecting room around 1900

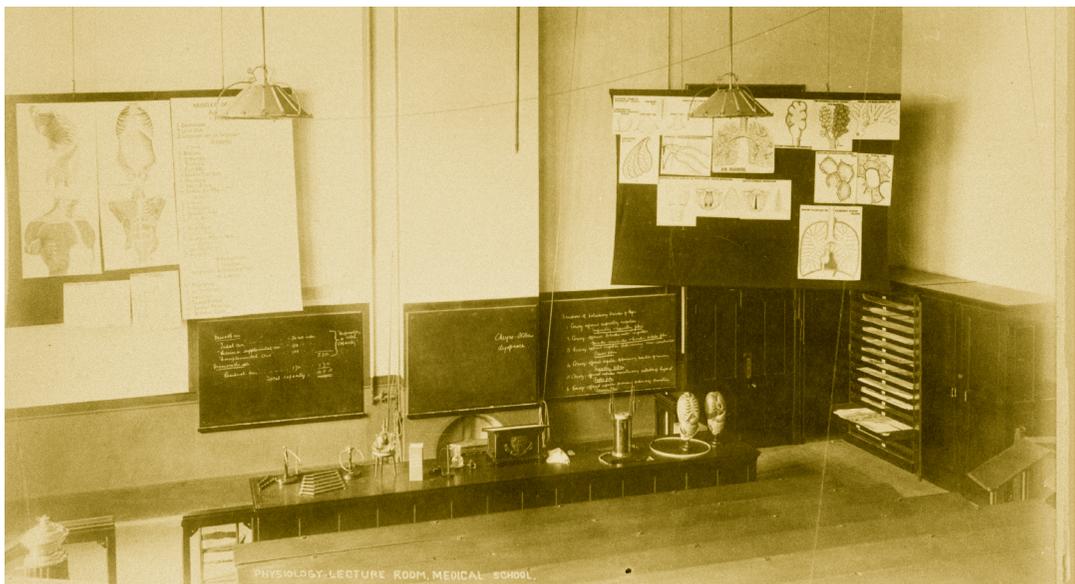
## The sixth curriculum: 1926–1974 as in 1954

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Botany <sup>†</sup>	Anatomy <sup>†</sup>	Applied Anatomy <sup>†</sup>	Bacteriology <sup>†</sup>	Anaesthetics	Clinical work
Chemistry <sup>†</sup>	Biochemistry <sup>†</sup>	Neuroanatomy <sup>†</sup>	Pathology <sup>†</sup>	Paediatrics	
Physics <sup>†</sup>	Histology <sup>†</sup>	Neurophysiology <sup>†</sup>	Pharmacology <sup>†</sup>	Obstetrics and Gynaecology	
Zoology <sup>†</sup>	Physiology <sup>†</sup>	Special Physiology	Medicine	Psychiatry	
			Surgery	Jurisprudence	
			Clinical Lab methods	History of Medicine	
			Therapeutics	Public Health	

<sup>†</sup> required laboratory practical work

## Curriculum change: 1970s and 1980s

As knowledge expanded, new subjects were introduced, without compensatory reductions. Not all teachers necessarily incorporated new ideas: some students found that parental notes for some subjects from 25 years earlier served perfectly well. Departmental resources were determined on teaching loads, and the power, standing or contacts of the professor; the incentive was thus to maintain or increase content and or contact hours. Each week, students were expected to attend up to 20 lectures<sup>†</sup> and spend up to 12 hours in practical classes in addition to time in dissection. Teaching was largely didactic, encouraging and rewarding rote learning and memorisation. Practical classes were often 'cook book' and repetitive, with little opportunity for interaction, exploration or initiative. Students' experiences in clinical settings were highly variable, from



Physiology lecture room around 1910

inspirational to hostile. Over the life of the sixth curriculum, enrolments increased, putting significant pressures on students and staff. Failure rates were high, disappointing for students and staff, and indicating inefficient use of resources.

Curriculum reform was triggered in 1972 by a report written by a physician, John Read. The seventh curriculum, of five years duration, was introduced in 1974, under the leadership of the then Dean, David Maddison. Principal architects were Ann Woolcock and John Chalmers, both physicians. At the time, high school education was extended to six years. The Universities of Sydney and NSW both determined at about the same time to change; each apparently thought that the other was taking the initiative and did not want to be left behind. Nevertheless, it provided an opportunity to review the program. The major reduction occurred in first year: the extra year at school was thought to enhance the students' understanding and maturity. Time elsewhere would be gained by reducing duplication and redundancy.

Six key aims of the new curriculum were noted:

- horizontal integration between preclinical disciplines;
- the introduction of behavioural sciences;
- the development of integrated clinical sciences;
- the introduction of General Practice;
- specific teaching in history-taking and physical examination;
- the development of a strategy for progressive assessment.

At that time, Bill McCarthy (a surgeon, then a Senior Lecturer) presented a well-researched Faculty paper on evaluation of teaching by students, a novel idea. It was accepted, although a vocal minority of staff considered that it was inappropriate (or threatening) for students to comment on experienced teachers. The process has endured, providing evidence to support modification and development of the curriculum and teaching methods. A Staff-Student Liaison Committee was established for face-to-face discussion of teaching and learning.

The University of Sydney was then the largest medical school in Australia, with the most daunting student-staff ratios. In 1975 there were 1804 students, with 159 equivalent full-time staff and a student-staff ratio of 11.3. The University of Melbourne, the next biggest, had 1625 students, 216 staff and a ratio of 7.5. In Sydney, most clinical teachers were not paid, unlike in some other states, implying that the Faculty was significantly underfunded.

David Maddison departed to the new University of Newcastle and John Chalmers to Flinders University, where they contributed to founding new medical schools. When Richard Gye was appointed as the first full-time Dean in 1974, he inherited management structures that were inadequate and too weak to over-ride strong individual departments which received their

budget allocations directly from the Vice-Chancellor. Reactionary forces prevailed: didactic methods dominated and increasing factual information was crammed back in, enhancing departmental funding.

Interest in professionalism in medical education was growing. A World Health Organization Regional Training Centre was established at the University of NSW, although the University of Sydney had hoped to secure it. The Dean sent Ann Sefton to attend an early workshop to develop a course in Neuroscience, replacing independent Neurophysiology and Neuroanatomy courses.

Educational discussions in 1972 in Canberra, led by Bill McCarthy from the University of Sydney and Fred Katz from the University of NSW, resulted in the establishment in 1973 of the Australasian and New Zealand Association for Medical Education (ANZAME). Bill McCarthy, elected Chair, has been a key figure in the organisation for many years. Staff and students from the University of Sydney were among the founding members, serving on early committees. It has been an eclectic, enduring and effective association. Unlike many such groups overseas, it consistently embraced all health-related disciplines, the inter-professional diversity and collaboration providing enduring sources of strength. The conferences continue to attract speakers of major international standing.

#### The seventh curriculum: 1974–1985; as in 1981

Year 1	Year 2	Year 3	Year 4	Year 5
Chemistry <sup>†</sup>	Anatomy <sup>†</sup>	Neuroscience <sup>†</sup>	Paediatrics	Medicine
Physics <sup>†</sup>	Histology and Embryology <sup>†</sup>	Clinical Sciences	Psychiatry	Surgery
Intro Medical Sciences	Biochemistry <sup>†</sup>	Pharmacology <sup>†</sup>	Obstetrics and Gynaecology	
Behavioural Sciences <sup>†</sup>	Behavioural Sciences <sup>†</sup>	Behavioural Sciences <sup>†</sup>	Community Medicine	
Anatomy <sup>†</sup>	Physiology <sup>†</sup>	Bacteriology <sup>†</sup>		
Biochemistry <sup>†</sup>	Pharmacology <sup>†</sup>	History and examination		
Physiology <sup>†</sup>				

<sup>†</sup> required laboratory practical work or tutorial attendance

Michael Blunt, from his arrival in 1973, revolutionised the teaching of anatomy. Challenged with questions, groups explored structural details from prosected specimens and discussed answers with tutors. Behavioural objectives guided learning. The method was popular with students and most staff. Students' performance in anatomy examinations was enhanced, while teaching time was reduced. Attendance in dissecting rooms had previously been compulsory in second year, although participation was not always monitored. Some staff regretted when dissection became optional, but many students had not found it useful for learning.

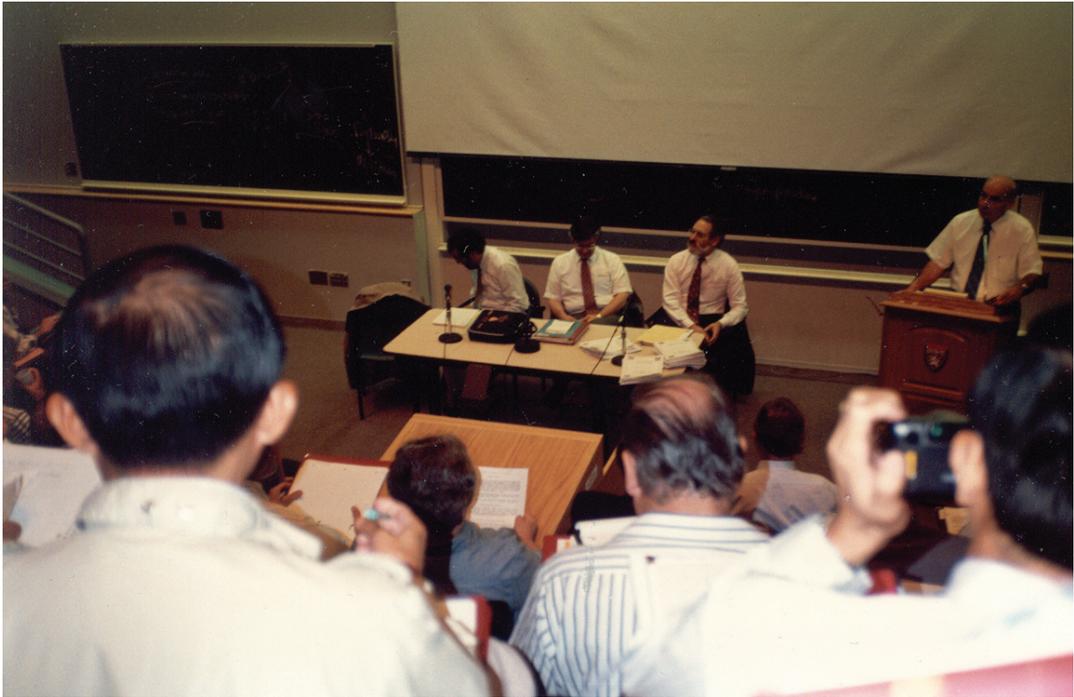
In 1976, soon after implementation of the new curriculum, concerns were expressed. Objectives or goals had not been determined to provide a framework: the curriculum lacked a sense of progressively building knowledge. Classes were large. The planned integration failed: subjects were poorly correlated. Contrary to initial ideals, paraclinical teaching was on campus in the mornings, with clinical work in the afternoons at teaching hospitals. One solution was to move elements of courses around without addressing structural problems, and timetabling became very complex.

Other difficult issues related to assessment. Some staff sought to clarify expectations for students by setting specific objectives, while others found that approach too prescriptive, arguing that it restricted learning. Students were thus confronted with conflicting expectations and information. Difficulties were arising from a mix of 'non-terminating' subjects (allowing some who failed a component to proceed) and 'terminating' elements (requiring a re-sit or repeat after failure). Barrier assessments were held at different times, complicating progression for students who failed. Students complained of stress from the intensity of assessment, and tutors were appointed to help them. In 1976 the Dean, aware of the tensions, established an Advisory Committee on Curriculum. Their report in 1978 highlighted the strengths: the Option term and the introduction of Behavioural Sciences and Community Medicine. Acknowledged weaknesses included higher teaching workloads and insufficient staff in Behavioural Sciences to implement the planned teaching.

## The 1980s

In June 1980 the Faculty agreed again to evaluate teaching systematically; staff were encouraged to retain their individual reports to support applications for promotion. The Faculty considered a return to a six-year curriculum, and in July 1981 a report prepared by a Vice-Chancellor's committee recommended extension back to six years. A steering committee was appointed, but no immediate action resulted.

In 1983 complaints continued. Enrolments remained high with 1276 students in the program and 12 undertaking the intercalated BSc(Med) degree. A survey of students' views on the final two years was undertaken and a Faculty Curriculum Workshop was held in Wollongong, led by Stephen Leeder. The report handed down in March 1984 listed issues of ongoing concern: a lack of explicit objectives against which to evaluate; weak or ineffective overall control; inadequate selection of students; no agreed 'core'; clinical sciences, clinical teaching and the internship year were poorly correlated; and subjects were not effectively integrated. Recommendations included the appointment of a small, effective, representative curriculum committee 'with teeth'. Objectives were to be developed. A 'core and options' framework would define material that was essential, highly desirable, desirable or additional. There was to be integration between basic and clinical subjects, amongst different basic sciences and within clinical subjects. Staff development was



A lecture in the eighth curriculum

seen as essential. Although it was suggested that an aptitude test be developed for admission to Medicine, the idea was not pursued. Some urged that students disadvantaged during their school years be offered special consideration. At that time, no vote was taken on the length of the curriculum.

The final recommendation, adopted by the Faculty in June 1984, was to extend the program to six years in a staged process the eighth curriculum. A new program for third and fourth years would replace Year 3; first and second years would be revised; then the new fifth and sixth years developed. That approach accommodated newer disciplines without a major re-think of the basic structures and overall balance. It was noted that there would be no large graduating class in 1990, helpful in reducing a projected over-supply of doctors.

Up to that time, Australian medical schools were accredited by the General Medical Council of Great Britain. Largely based on discussions with the Dean, the process was not rigorous, offering little involvement for staff and none for students. The Australian Medical Council (AMC) was established in December 1983 and would commence its activities in 1985. It developed into a powerful organisation with the role initially of accrediting medical schools and more recently postgraduate training programs, using a collegial but rigorous process. It offers individuals from medical schools the privilege of reviewing other programs, sharing knowledge nationally. In 1987, the General Medical Council of Great Britain accredited the Sydney program for the last time.

In 1985, a committee chaired by John Young outlined the first three years of the new curriculum. First year included basic sciences and medical history; second year retained traditional medical sciences but introduced pharmacology; third year on campus comprised clinical sciences (neuroscience, clinical physiology and biochemistry, pathology, pharmacology, and infectious diseases) with clinical diagnosis in hospitals one day each week. A combined Arts/Medicine program was introduced at that time. In 1990, a Science/Medicine program followed. Both attracted highly motivated and very capable students. Some students graduated from the combined programs in minimum time, but most extended their enrolment to accommodate the additional studies.

Public Health was included within the Faculty in 1985 (see Chapter 7), making it possible to integrate its teaching more effectively into the medical curriculum. The introduction of a four-term school year in NSW later resulted in a semester system for the university, replacing the traditional three term structure. New semester-length courses were developed, offering more flexible combinations of subjects. Opportunities were opened up for a University summer school as well as international student exchanges.

#### The eighth curriculum: 1986–2002 as in 1989

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Biomaths <sup>†</sup>	Anatomy <sup>†</sup>	Clinical Diagnosis	Clinical Science 2	Community Medicine	Medicine
Chemistry <sup>†</sup>	Biochemistry <sup>†</sup>	Clinical Science 1	Pathology	Paediatrics	Surgery
Behavioural Sciences <sup>†</sup>	Behavioural Sciences <sup>†</sup>	Behavioural Sciences <sup>†</sup>	Infectious Diseases	Obstetrics and Gynaecology	
Physics <sup>†</sup>	Physiology <sup>†</sup>	Immunology	Pharmacology	Psychiatry	
Intro Med Sci <sup>†</sup>	Pharmacology	Infectious Diseases <sup>†</sup>	Medicine		
History of Medicine	Histology and Embryology <sup>†</sup>	Medical Biochemistry	Surgery		
Anatomy		Neurosciences <sup>†</sup>	Public Health		
Histology and Embryology		Pathology <sup>†</sup>			
		Public Health			

<sup>†</sup> required laboratory practical work or tutorial attendance

### Issues in selection of students: 1950–1993

Selection of medical students was a contentious issue. From the late 1950s, it was no longer feasible to admit all matriculated applicants. Students who failed more than once could not re-enrol. Senate imposed quotas on interstate and international applicants; the latter were subject to an English language test. One key concern was that the Higher School Certificate (HSC) was a poor predictor of university performance: correlations between HSC and university results were weak in first year, decreasing thereafter. An aptitude test was suggested, but not adopted.

By the 1980s, the characteristics and commitment of the medical students were causing concerns. Access through the HSC was increasingly competitive; in NSW, entry to Medicine at the University of Sydney required the highest marks. Some students commented that – even without any interest in Medicine – they ‘did not want to waste’ their score. Increasingly, scaling processes saw the highest HSC marks coming from 4 units of Mathematics taken by 90% of successful applicants to Medicine. The great majority studied physical sciences and very few studied biological subjects. The English mark was not necessarily included in the aggregate.

In 1984, the Faculty reviewed admissions. The local quota was 250, with some additional places for overseas applicants, mostly from Singapore or Malaysia. The novel alternative criteria for selection into Newcastle Medical School were discussed but not adopted.

The Faculty again in 1985 concluded that existing practices were administratively simple and generally accepted; at that time places were allocated for ACT and interstate applicants. Delaying selection until Year 2 was rejected. The idea of accrediting ‘good schools’ met strong opposition. Better information would be provided, through active liaison with schools and prospective students. In response to Sydney medical graduate and NSW MP Andrew Refshauge, it was agreed that Indigenous applicants would be encouraged and supported.



The Wilson Museum of Anatomy in 1978

In 1986 the Faculty again discussed selection but no consensus was reached. Despite the high scores at entry, graduation rates were disappointing. Of all cohorts entering Year 1 in the five-year program between 1974 and 1985, 92.5% ultimately graduated (although many required substantial extra time to complete). A more rigorous cohort study was carried out by the Registrar: only 62% of those who completed MB BS in 1986 had graduated in minimum time. By the end of 1988, only 86% had completed the course, indicating substantial attrition. A later analysis showed that those admitted to Medicine with a degree were more likely to graduate with honours, and those who transferred with good results in first year Science performed less well than HSC entrants. Students admitted on the basis of health professional experience performed at or above the average.

The university-wide Broadway Scheme was introduced in 1988 to offer a small selection advantage to those who had suffered significant hardship during their school education. They performed well and graduated successfully. In the same year, a 'personal tutor' scheme in Medicine – the Professional Academic Support Scheme – was introduced to assist students in difficulties, ably managed by Suzanne Abraham. The Faculty agreed to provide an exit degree at the end of three years, but it was never implemented.

In March 1990, a Faculty Admissions Committee was established, chaired by Ann Sefton. Each intake was analysed and reported. Medicine at Sydney had the highest cut-off score, so students, parents and schools saw entry to be highly prestigious. When asked why they chose medicine, the commonest response from students was 'I got the marks'. School subjects were chosen on the basis of weightings. Of the cohort entering in 1990, typical of groups before and later, 88% had studied 4 unit maths, not a requirement for entry to the highest level maths courses at university. With scaling, the selection advantage between the 4 unit and 3 unit courses was about 28 points. Of the total enrolment, all but seven had studied Chemistry, all but six chose Physics; only 22 selected Biology. The commonest additional subjects included in the aggregate were Economics (about a third of the cohort) and Engineering Science (about a fifth). The Faculty determined that no more than 3 units of mathematics should be included in the HSC aggregate for Medicine, but the proposal was never implemented.

#### Admission data

Year	HSC	Broadway	Internat	Indig	Univ. transfer	Allied Health	Grads	Total
1987	225	n/a	16	0	n/a	14	12	256
1991	175(183)	31(31)	25(36)	2(2)	22(44)	5(13)	20(41)	258
1994	121(136)	16(16)	10(29)	1(1)	8(8)	3(5)	18(25)	189

Admission data – offers (acceptances) – for entry to first year for three years of the undergraduate program in four categories of undergraduate entry: direct from HSC scores, Broadway (disadvantaged students, instituted in 1988), international, and Indigenous students. Some transferred after first or second year in another faculty. Allied Health included nurses and other health professionals. Graduates came from a range of faculties. In addition, four refugee medical students were admitted to higher years after interview.

Communication in English was becoming a concern. Of the students enrolling in 1990, 51% studied the standard (2 unit) English program, 8% the most demanding (3 unit) course, and 41% the basic program designed for those whose first language was not English. The English mark did not necessarily contribute to the aggregate for selection.

By then, evidence from the University of Newcastle (NSW) demonstrated that performance in an objective, structured interview predicted success and retention in medicine. By contrast, in the University of Sydney, HSC scores did not correlate with performance in the program and retention was disappointing. Bill McCarthy suggested exploring the structured interview, but no consensus was reached.

In 1991, a valuable Communications Committee report was presented to the Faculty by Susan Hayes and Doug Farnill. Marks in HSC English correlated strongly with overall performance at university. From standard oral and written English language tests, 24–30 students per year were shown to have significant deficiencies. The Faculty then recommended that at least 2 units of English be included in the HSC aggregate for selection into Medicine but it was not implemented.

To assist students with poor communication skills, a new and effective strategy was introduced by Hayes and Farnill. After early screening to identify language and communication problems, those who did not meet the criteria were supported by the University's English language services, working with the Department of Behavioural Sciences. A barrier assessment in Year 3 identified students whose language skills did not meet the standard for progression to the clinical environment. They would not repeat subjects already passed, but were required to undertake English language development in the following year. In the event, of the few who failed to reach the Year 3 standard, all were proficient after the delay and progressed.

Doug Farnill and Susan Hayes documented the characteristics of enrolments between 1990 and 1994 (inclusive). The ratio of females to males increased – from 37:63 to 46:54. Using demographic measures, students coming from the 10% most affluent postcodes increased (from 28% to 39%), the middle 60% (from 52% to 41%) decreased, but those from the least affluent (around 20%) were stable. This change was matched by increases in the occupational status of both mothers and fathers. In 1990, 47% of local students were born overseas; by 1994 it was 62%; in NSW generally, the proportion was about 20%. An increasing fraction of students did not have English as a first language (from 36% to 45%).

Fewer than 3% of students educated in NSW came from outside of the greater Sydney region, an under-representation, since about 16% lived there. International student numbers had been increasing over time.

## Curriculum reform in the late 1980s

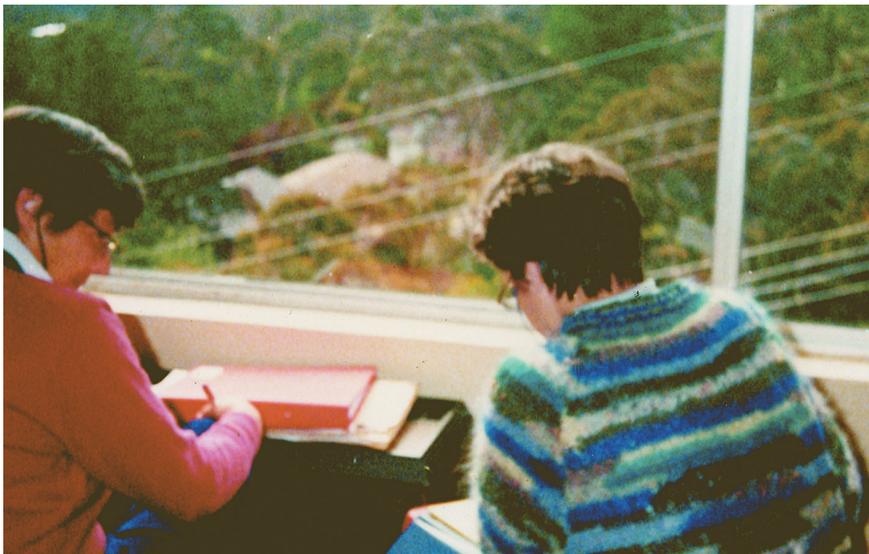
A significant Faculty Workshop was held in Leura in September 1988, facilitated by Jackie Lublin from the Centre for Teaching and Learning. Nearly 100 members of staff and students discussed four issues in groups: future change; structures for curriculum management; 'vertical streams' to link basic and clinical learning within disciplines; and assessment. Three Sub-Deans – Michael Field, Jack Harris and Ann Sefton – presented a summary of the major conclusions in November. The principles were to prove enduring:

- a matrix structure to take account of vertical development within topics as well as horizontal integration between them;
- sub-deans appointed to oversee the developments;

- management by a 'curriculum committee with teeth';
- lines of communication to be established using modern technology;
- open workshops to be held for staff and students;
- the definition of 'core' material requiring high criterion levels for pass (but multiple attempts would be supported);
- honours work to be defined within strands or streams (rather than awarded on an overall high aggregate);
- formative assessment to be developed for frequent feedback and to encourage self-assessment.

With the projected development of teaching hospitals in Western Sydney, clinical teaching in Year 3 would be decentralised. After a workshop, it was recommended that students spend three days on campus and two in teaching hospitals. The change would be phased in and reviewed. That decision, giving greater responsibility to clinical teachers, prepared the way for the later development of clinical schools.

Richard Gye retired and in April 1989 John Young succeeded him, drawing attention to the substantial changes that had occurred under Gye's deanship. The Leura educational report was re-tabled; Ann Sefton and Michael Field were appointed as Sub-Deans (Curriculum). With Paul Seale, Susan Hayes and Kim Oates they constituted an Appeals Committee to establish procedures for students who had failed an examination.



Jacquie Lublin and Ann Sefton at the Leura workshop

By November 1989 eight committees on 'body systems' (e.g. cardiovascular; neuroscience) had been active. Each set goals and listed relevant content, documenting a longitudinal evolution in knowledge and understanding. No major change would be implemented until the process was complete. New inter-departmental working parties interested in Cancer Sciences, Behavioural Medicine and Communication, Law and Ethics started discussions. It was the first time the geographically dispersed staff had been involved in a widespread, ongoing 'vertical' collaboration.

## The early 1990s: decision-making for change

Senior students continued to complain that the curriculum was overloaded, focusing on memorisation. One University Medallist described his experience as "sitting the Higher School Certificate six times". Staff realised that students would need new skills of analysing and applying new knowledge. Graduates would have to commit to life-long learning.

The most substantial review ever undertaken of students' perceptions of the University of Sydney curriculum was undertaken during 1991, preparing for the visit of the Australian Medical Council. Les Irwig chaired the committee. Pilot studies established the most effective questions, ensuring that responses were repeatable and reliable. In all, 78% of students completed the survey. The information was invaluable for accreditation, and represented a 'snapshot' of the existing program as a basis for future development.

Faculty members were realising that their roles would have to change – from delivering factual information to mentoring and supporting learning. Staff development would be needed for new educational approaches: tutoring; using computer-aided learning; developing clinical skills; and encouraging self-directed learning. Staff were acknowledging the need to prepare supporting materials and explore new forms of assessment.

Early in 1991 the Dean visited Harvard Medical School, where the 'New Pathway' program for the first two years was problem-based, student-centred and integrated; time was protected for self-directed learning. Dan Tosteson (Dean) and Dan Federman (Dean for Education) offered a place for Ann Sefton to attend an intensive, one week program. Stephen Leeder, then on sabbatical leave, tutored in the course that modelled the educational program: a few outstanding lectures along with lively interactive learning in small and large groups. The Sydney pair saw no reason why a similar philosophy could not be applied at home, despite Harvard's greater resources. Modifications would be required, including central control of the budget, but they saw no insuperable barriers. Later, the Dean sent more staff to the Harvard program; some also visited Maastricht and other problem-based schools. Many Sydney staff were familiar with the University of Newcastle medical program.

In Washington, Ann Sefton discussed the Medical Colleges Admission Test (MCAT) with staff at the American Association of Medical Colleges. Previous visits to the University of Pittsburgh



The atrium at Harvard Medical School

and Cornell Medical College had provided opportunities to review other aspects of student selection and support.

After nearly three years of attempted curriculum change, and facing the inequities and inefficiencies of existing selection procedures, the Faculty agreed in principle in October 1991 to explore the feasibility of a four-year, graduate-entry medical program and to report back in one year. Five working parties were established (with Chairs): Goals (Stephen Leeder), Curriculum (Ann Sefton), Assessment (Bill McCarthy), Admissions (Ian Fraser) and the development of Clinical Schools (John Stewart). A total of 118 staff and 17 students joined one or more of the committees; such

wide participation ensured good communication and intense activity. Each committee organised an open workshop during the year of discussion. Sub-groups also met to explore particular issues. The process was facilitated by the relationships developed during 'vertical stream' discussions.

The first workshop on Goals was surprisingly tense and combative: a vocal group disputed the usefulness of setting targets. The majority, however, accepted the need for a framework to support progressive development of knowledge and skills. Rather than attitudes that can only be inferred, behaviours were defined. Some individuals demanded early specialisation, others argued for a generalist approach. The latter view prevailed; elective time would encourage students to pursue particular interests. The goals were grouped into four themes: Basic and Clinical Sciences, Patient and Doctor, Community and Doctor, Personal and Professional Development – the scaffolding for an integrated and progressive curriculum. Subsequently, under the leadership of Jill Gordon, the original goals were reviewed and refined, by inviting comments from not only clinical teachers,

academic staff and students, but practitioners, other health professionals, university staff, consumer and community groups.

In early meetings on Curriculum, some senior staff argued to maintain traditional, discipline-based, didactic approaches. Others supported integrated, progressive and active learning. After unproductive circular discussions, a questionnaire revealed a commitment to progressive, problem-based, active learning, based on the Leura 'body systems'. New aspects (e.g. cells and molecules, tissues and defence) would need to be included. Study problems would include all four curriculum themes.

At the assessment workshop, it was readily agreed that integrated themes, not individual topics or subjects, would be tested. Differences arose, however: some demanded a rigorous evaluation of facts and others sought to measure deeper understanding. Although some argued for grading and ranking, a criterion-referenced approach – setting defined standards to reduce destructive competitiveness – prevailed. Formative assessment (opportunities to practise the different formats) would be offered, with feedback on performance. Clinical assessment was acknowledged to be particularly difficult, but core principles were established. All examiners must be trained, to ensure consistency and reliability.

Selection was a key issue, and the report was based on a wide exploration of current evidence. Graduate entry was widely, but not universally, supported at first. The shortcomings of selection from school were evident. Within the University, some (including members of Senate) were appalled that the Faculty would 'give up' the 'top' school performers, despite the poor predictive value of HSC results. Some were concerned that those 'top' students would go elsewhere, but since the other medical schools in NSW were using additional selection criteria, that was not a valid concern. The Dean consulted principals from an eclectic mix of schools whose students regularly entered the medical program. All but one strongly supported the proposal. In the event, Sydney continues to attract a cohort of exceptional school leavers into diverse new undergraduate programs. Some make a later and more informed decision to study Medicine.

The group considering Clinical Schools recommended assigning students to the same school for four years. To minimise travel, students in Years 1 and 2 would attend the clinical school one day each week, learning clinical and communication skills relevant to the current problem. Each school would be autonomous and self-sufficient, although all would contribute to central curriculum development and support. Effective clinical teaching and assessment would be applied, supported by staff development. The program must broadly prepare students for any path in medicine, although some would target a particular career. The group endorsed opportunities to undertake an intercalated research degree (PhD, MPH) or to participate in other research activities.

During 1992, chairs of major committees became aware that the University of Queensland and Flinders University medical schools were considering a similar change. Representatives met and formed a unique Consortium of Graduate-entry Australian Medical Schools. Not only a source of ongoing mutual support and lasting collaboration, the Consortium made planning more efficient as each school led development in areas of strength. Solutions and strategies were shared, reducing duplicated effort and enhancing the quality of the ultimate programs.

The Consortium secured a joint grant from the Australian Government (Minister for Education, Peter Baldwin). The funding in part supported the establishment of educational units which have been invaluable in developing the expertise of staff. In collaboration, Consortium members developed, evaluated and shared experiences. Solutions developed in one school were modified and applied elsewhere. Planners enhanced their educational expertise and provided mutual support. The process led to enduring educational and research collaborations.

Principles for selecting students emphasised fairness, consistency and clarity. The aim was to identify diverse applicants with maturity and good communication skills. Scientific and abstract reasoning was valued. A credit average (or equivalent) would be required in the first degree. A structured interview would be developed, based on evidence from the University of Newcastle of



Steps leading to the Quadrangle seen from the Anderson Stuart Building

its predictive value. The usefulness of the American Medical Colleges Admission Test (MCAT) was recognised, but it had limitations in the Australian context. With senior staff of the Australian Council for Educational Research (ACER), representatives explored the development of an equivalent local test. Development was overseen by a management committee drawn from the three schools with Stephen Leeder as Chair. The resultant Graduate Australian Medical Schools Admission Test (GAMSAT) has proved to be effective. It is designed to evaluate reasoning in the sciences and in the social sciences and humanities, along with written communication. More recently, it has been adopted by new graduate entry medical programs in Australia and the UK.

In October 1992, the largest ever Faculty meeting endorsed the proposals with one additional provision: the Dean must be confident that adequate resources were available. The voting was 166 in favour, and six against. Ten absent members of staff also sent messages of support. The planners were euphoric, but the massive and complex task of developing an entirely new curriculum to embrace the new principles had only just begun.

## Resources: supporting curriculum change

Once the decision was taken, funding would be needed for new selection methods, professional educational support during the planning phase, and designing and developing new activities. In particular, this included the problems for Years 1 and 2; online delivery of teaching; new clinical teaching to start from first year; managing integration and curriculum delivery; developing and implementing new assessments; and an expanded system of evaluation. Academic staff needed new skills. Support staff would be required to support the new educational initiatives and selection process.

A greater emphasis on small group work was initially considered to be an expensive solution. Detailed modelling, however, demonstrated that in steady-state, if students had protected time for self-directed learning, the overall demands on staff would not exceed current levels.

The government grant supported initial planning. In shortening the curriculum, however, fewer students would be enrolled at any one time, reducing overall funding. At that time, medical school enrolments were tightly controlled and intakes were diminishing. The Dean's successful negotiations ensured that student load was shifted into the Faculty's postgraduate programs and expanded undergraduate medical science degrees, particularly the new BMedSc (see Chapter 3). Ironically, a shortage of practitioners is now projected; quotas for medical places are increasing, and new medical schools are being established to meet the shortfall.

One issue raised was the gender ratio and strategies to encourage more women (then under-represented) to enter medicine were suggested. In the event, and without any specific activities, a majority of the students are now women.

## Maintaining the six-year curriculum

Meanwhile, students were still entering the six-year undergraduate program. A survey of staff was carried out in 1993, providing information to support the continuing program and ideas for the future. Respondents were generally happy with their own segments, but less so with those taught by others. A majority, however, felt that they had not been consulted about the content and teaching processes, particularly in clinical areas. Most considered that students lacked appropriate interpersonal skills. About half the preclinical teachers, but only one-third in the clinical years, felt that students had been adequately taught. Several characteristics were poorly developed: teamwork, interpersonal skills, scientific curiosity, self-directed learning and a desire to understand rather than pass exams. Although end-of-program objectives were generally met, integration was considered poor. Staff considered that objectives were clear, although students disagreed. Objectives based on knowledge were met more effectively than those on skills or behaviours.

Originally the graduate program was to be implemented in 1996, but it was reluctantly postponed until 1997. Faculty needed time to prepare for the first full accreditation of the 'old' six-year curriculum by the Australian Medical Council in 1995. That proved to be a daunting, time-consuming and expensive task of documentation and reporting to ensure a successful outcome. Colleagues at Flinders Medical School provided support. The Dean's ongoing reviews of each department were helpful, demonstrating that problems were identified and reforms initiated. Issues identified by the recent evaluation of the program were being addressed. Accreditation was successfully achieved. For the developers, though, the process represented a distraction: an enormous effort for a curriculum that would run for only a few more years.

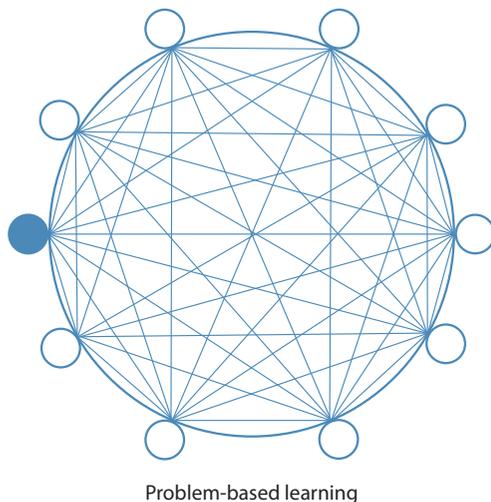
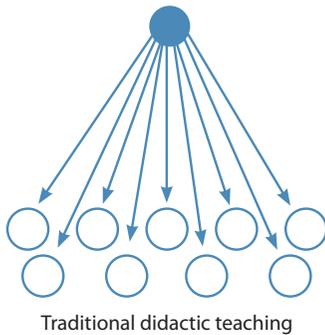
The last full intake into the 'old' undergraduate program occurred in 1994. It had been hoped to sustain two years without new enrolments. Financial modelling, however, demonstrated that enrolments in 1995 and 1996 were essential; they were restricted to international students. Maintaining the program allowed those who had experienced academic or personal difficulties, or who undertook a BSc(Med) degree, to complete their studies. Although enrolments were modest in 1995 and 1996, strains on staff were substantial, since a full didactic program had to be taught. The only relief was a smaller number of duplicated practical classes and clinical placements.

## 1994–5: developing the four-year program

Stephen Leeder was appointed as Pro-Dean to oversee the developments. Jill Gordon joined Michael Field and Ann Sefton during 1994. This core group immediately set about planning for the future, focusing early on overall principles and broad design. The program was conceived as a progressive spiral, revisiting and reinforcing earlier concepts and ideas over the four years.

In March 1994 a workshop was held on campus to report on progress, and it was summarised in Planning Paper 1. The four themes originally conceived would continue progressively throughout the four years. Problem-based learning (PBL) would start immediately. Core problems would be developed for all stages of the curriculum, with a major emphasis in the first two years. Students and staff, however, would need orientation and targeted preparation for the new learning activities.

To introduce members of Faculty to PBL, a showcase was arranged at Royal North Shore Hospital with a first-year group from University of Newcastle Medical School (with their tutor Isobel Rolfe) demonstrating tackling an unseen problem. The event generated great interest, but substantial differences of opinion emerged. Although many were excited, some senior clinicians were vocal in their opposition, regarding the process as inefficient: "I could tell them all that in a fraction of the time." The latter dominated discussion at the time, but an exit survey demonstrated that the great majority present (84%) endorsed active problem-based learning.



Traditional methods of teaching depend on the teacher instructing a passive class. Problem-based learning involves active interactions between students and students, and students and the teacher.

The four themes provided the framework for curriculum design. One problem is presented each week, with three PBL tutorials. The Basic and Clinical Science (BCS) Theme developed some supporting lecture topics, up to five (now six) lectures, materials for the Web and two hands-on practical sessions. Patient and Doctor (PD) Theme members developed two sessions in the clinical schools to develop related communication and examination skills, with additional procedural skills if relevant. Community and Doctor (CD) focused on relevant community-based issues arising from the problem, alternating with Personal and Professional Development (PPD) in providing one session each week. A progressive program in Evidence-Based Medicine was developed for some PPD sessions, tied to particular problems.

In response to concerns about student numbers in the overlap period, Planning Paper 2 (1994) provided calculations of student loads to support forward planning.

Planning Paper 3 (Ann Sefton) introduced staff more thoroughly to issues in problem-based learning; it included a review of the educational

evidence for the process and outlined the planned strategies for developing and presenting the University of Sydney problems.

In the first two years, students attend their clinical schools for one day each week. The resulting 'clinical day' is consistently the most popular part of the Year 1–2 program. Relevant procedural skills are included, and dedicated labs provide opportunities to learn and practise, supervised by trainers. The aim was to develop clinical and communication skills at the end of second year to the level of the fourth year students in the undergraduate program.

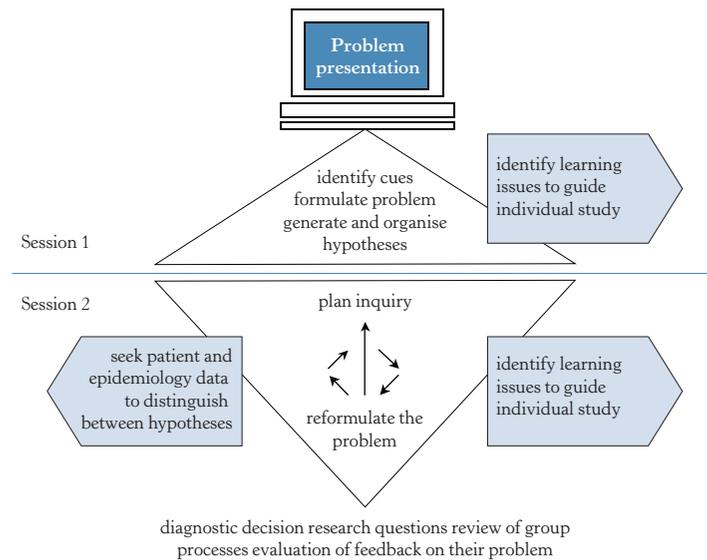
In May 1995 Reference Notes for Planners outlined the principles, themes and goals, with calculations of workloads for staff and students. Nine 'blocks' of related material in Years 1 and 2 were indicated. A typical timetable was developed. Seven of the nine blocks of problem-based learning problems would be based at Camperdown campus; two blocks (Haematology in Year 1 and Cancer in Year 2) would be undertaken entirely in the clinical school environment. That is particularly appreciated by the students, and hospital-based staff gain experience in tutoring early in the program.

Assessment drives learning, but remains the most difficult aspect of any curriculum. It has consistently generated the most energetic debate; indeed, some early issues are revived more or less annually. Planning Paper 4, edited by Jill Gordon, strongly argued that the primary focus of assessment is to ensure that students achieve the goals of the curriculum. A wide variety of formats matches the diversity of outcomes. The Assessment Office, established to implement the policies, now includes staff with professional expertise in assessment, and other academic staff have developed specific skills and interests. The focus is on understanding and problem-solving, replacing memorisation and recall. Students must demonstrate that they meet or exceed the progressive criteria set for each theme. Specific feedback is provided to support improvement. With a centralised structure, validity and reliability are strengthened. Arthur Conigrave built on the earlier work of Bill McCarthy.

The emphasis is on criterion-referenced assessment (meeting specific goals or requirements) rather than norm-referenced (comparative ranking). As is now required by University regulation, students are offered practice and feedback (formative assessment) before meeting barriers. New validated forms of assessment have been implemented, including modified essay questions that focus on resolving a progressively revealed clinical problem. Good quality multiple-choice questions are also used. Objective structured clinical examinations (OSCEs) are supervised by trained examiners. PBL tutors assess the group process formatively, to enhance learning.

Another difference is that awarding honours, formerly based on accumulated marks, now requires the completion of a supervised research project, consistent with University policy. The Faculty's many prizes are now awarded for projects, essays or research reports.

## PBL and the clinical reasoning process



Outline of a typical problem. From a brief presentation, the group identifies learning issues broadly, then breaks for members to pursue their learning. They return to develop an inquiry strategy to gain further relevant information. They study and return to reformulate the problem, resolve the key issues and consider relevant research. The final step is to review the effectiveness of the week's activities.

Students must demonstrate understanding of relevant community issues, and personal and professional issues, the latter including evidence-based medicine. New assessments in those themes include relevant questions in standard papers, a portfolio followed by an interview, presentations of prepared work and evidence of satisfactory performance in clinical tasks.

The original decision not to grade the students competitively remains contested amongst staff, and heated discussions arise regularly. A consistent majority of students endorses the pass/fail system, providing that useful feedback on their performance is offered.

Planning Paper 5 (Ann Sefton and Philip Kuchel) supported the inclusion of options; only one can now be formally supported, in the second year. Examples from a diverse set include Medicine and Literature (originally led by Stan Goulston), learning Auslan to communicate with the deaf community, clinical projects, research, including laboratory science, social science, community or clinical studies. Some are undertaken as team projects, with defined requirements for each participant. An elective term was retained (see later discussion).

An early decision was made to embed the use of information technology (IT) into the program. Planning Paper 6 in October 1995 reported substantial development, representing the 'state of the art'. The 'patient' each week in Years 1 and 2 is presented as an image on the screen, with a brief voice-over. Timed release of information provides support.

The IT system was developed in advance of computer-based learning management systems now widely used in universities. The University of Sydney's was the first medical program to integrate

a problem-based approach with structured, supportive IT. It provides timed access to written materials, images, websites, library and other learning resources, formative assessment for students to monitor their own progress, and tools for evaluation. Simon Carlile, with Stewart Barnet and James Uther, led the design and implementation. A highly skilled IT support team continues to ensure the quality and currency of the materials and provides a helpdesk function. Three IT subcommittees were established: the overall networked system (Simon Carlile); development of educational software (Nick King); and medical informatics (Ross Lazarus).

Implementing the computer strategies was challenging. Some staff were competent, but most were novices. When submitting materials electronically, each was visited by IT staff to provide individual help. Since then, electronic communication has become universal. Complications arose, however, with different systems and media: one curriculum offering was presented on an ancient eight inch floppy disk that no existing technology could decipher.

Support from the librarians – Monica Davis (then the Medical Librarian) and her colleagues – was exceptional. They served on the Curriculum Committee and other groups, keeping staff abreast of issues, providing information on intellectual property, new technologies and resources. Library staff make available key materials online, ensuring that copyright is protected, and regularly provide training in bibliographic searching. The students have grown up with IT, and their skills exceed those of many graduates and teachers.

Evaluation in the program was the focus of Planning Paper 7. Bob Cumming’s report supported rational decision-making based on evidence, comprehensively guiding effective management of evaluation data. The new focus was on collecting information systematically, using online strategies to target specific issues. It promoted a model process for reviewing educational practice and responding to issues. It was planned to link de-identified information from students to later outcomes as practitioners.

Sample weekly timetable

	Monday	Tuesday	Wednesday	Thursday	Friday
am	Lecture	Lecture	Lecture	Clinical day	PBL 3
	Lecture	Lecture	Lecture		PBL 1
pm	BCS				
		PBL 2			
		Tutor meeting	BCS		C/PPD

The core of the learning is represented by the PBL tutorials. No more than six lectures are held each week; two sessions in Basic and Clinical Science and one either in Community and Doctor or Personal and Professional Development. One full day each week the students attend their clinical school for tutorials in communication skills, physical examination and procedural skills, all related to the issues relating to the weekly problem.



Jan

Nov

Foundation	Musculosk	Respiration	Haematol	Cardiovasc	
					BCS
					C/D
					P/D
					PPD

Neurosci, Vision, Behaviour	Endocrin, Nutr, Gastroenterology	Renal, Reproduct, SexHealth	Cancer, Palliation	
				BCS
				C/D
				P/D
				PPD

Integrated attach	Integrated attach	Integrated attach	Rotat Placem	
				BCS
				C/D
				P/D
				PPD

Elective	Rotat Placem	Rotat Placem	Rotat Placem	C o n f	Pre-Intern	
						BCS
						C/D
						P/D
						PPD

■ Campus

■ Clinical Schools

■ Community, other sites

■ Elective

Outline of the four-year curriculum. Note that the topics studied are based generally on body systems in the first two years and in hospital and community placements in Years 3 and 4. There is a progressive increase in complexity and depth over the four years. Note that the four themes (Basic and Clinical Sciences, Community Doctor; personal and Professional Development; patient and Doctor continue throughout the four years.

issues arising from group discussion. Staff from different disciplines collaborated to provide critical and creative suggestions. For the first time, many realised the power and effectiveness of the problem-based approach. In general, conditions that were common, treatable or preventable, or that introduced important core concepts were selected.

Key learning issues arising from the weekly problem are included in up to six lectures, focused practical classes, or available as 'Learning Topics' – up to eight searchable, web-based, one-page summaries with relevant images, references and keywords. Patient-Doctor activities in the hospitals were then designed: clinical communication and examination of patients related to the problem. Community-Doctor and Personal and Professional Development Themes provide relevant (usually interactive) sessions in alternate weeks.

At that time, few medical schools had developed a computer-based curriculum map. Previous examples had been prohibitively expensive; created by computer experts, they were rarely consulted by staff or students because they were neither user-friendly nor intuitive. Michael Field and Ann Sefton developed key elements of problems in a commercial database that collated the location, presentation, sex, age, and ethnicity of the 'patient', listing key learning issues. They then prepared a set of simple, searchable spreadsheets to list the various learning resources and activities for each weekly problem. The simple process is still in use. Both resources proved invaluable in locating issues and identifying unnecessary duplication or gaps. The resultant 'grids' are updated each year on the basis of ongoing evaluation by students, tutors and subject experts.

The database for accreditation of Years 1 and 2 of the new program was sent to the Australian Medical Council in November 1995; those involved were acutely aware that it was still a 'work in progress'.

## 1996: final year of preparation

In January 1996, progress to date was summarised in the comprehensive 1995 in Review. The report listed early educational publications, the first of many.

Although it was anticipated that, over time, the study problems would become obsolete and be progressively replaced, few have been radically altered. Ongoing review and evaluation continue to ensure that problems and content evolve in the light of research-based knowledge. A major systematic review is planned for 2006.

'Triggers' for the problems were prepared: images of 'patients' on computer, designed to encourage students to interpret visual cues; the brief introduction stimulates brainstorming, exploration and discussion. As each problem was defined, photographs of volunteers were taken for displaying on computer screen with a brief 'voice-over' to initiate the tutorial. The friends, relatives and acquaintances of Faculty members were willing 'models', along with many community volunteers.

After the first tutorial, students can access the database which includes summaries of key 'learning topics' for each problem and other useful resources. Each includes relevant references and key words to encourage searching for related information. In the second tutorial, further information, including data from clinical tests, is progressively accessed, and students search for evidence-based medicine and other resources. A summary is provided at the end of the third and final tutorial; the tutor and group then review the process.

Collaboration between staff has been crucial: clinicians and basic scientists shared development, generated realistic scenarios, ensuring that they were well integrated and at an appropriate level. Some accepted responsibilities to chair or co-chair a block of learning. Earlier discussions on 'Vertical Streams' had established an essential foundation.

Theme committees were established to oversee a progressive four-year development in knowledge and skills in Basic and Clinical Sciences; Patient and Doctor; Community and Doctor, and Personal and Professional Development. Each set objectives and defined the levels of knowledge, understanding and skills expected at the end of the first two years, and at the end of each of the various clinical attachments and rotations. Under the leadership of Jill Gordon, the goals at graduation were reviewed; diverse input from professional groups and community representatives greatly strengthened the document.

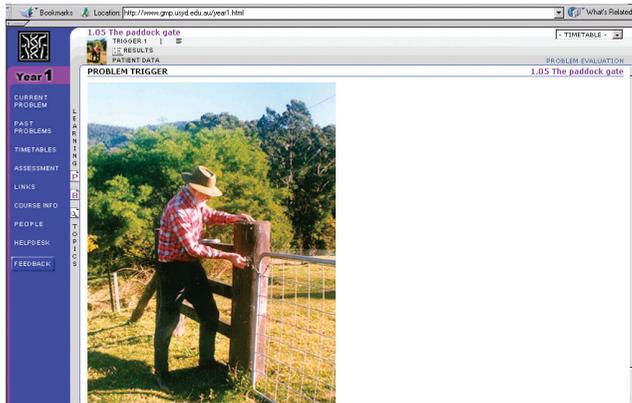
Members of the Basic Sciences theme reviewed the problems to ensure that the content was appropriate and up-to-date. They identified gaps that might be filled either by adding new aspects to a problem, or by ensuring that the issue would be covered in Years 3 and 4.

The Patient and Doctor group planned relevant and progressive clinical skills for the 'clinical day' the students would spend each week in the hospitals in Years 1 and 2. One tutorial focuses on communication and another on clinical examination relevant to the weekly problem. Supervised clinical skills were also practised in newly instituted laboratories in each clinical school before being applied in the wards. Providing these labs was unusual, since they are more commonly located on campus. In the event, they have proved to be particularly effective, since students have the opportunity to practise in context, sometimes immediately before undertaking a new procedure.

The Themes Community and Doctor (dealing with population health and social aspects), and Personal and Professional Development (introducing students to ethical issues and supporting their development) were integrated into each problem. That content had been poorly represented in previous curricula. Evidence-based medicine (EBM) was included in the latter theme as an aspect of professionalism and it has become a strength. Innovative approaches progressively encourage students to develop and apply their skills to answer questions relevant to their patients.

Staff development for all PBL tutors was essential with such a radical educational change. Tutors must be active observers of the learning process: in Jill Gordon's words to act as a 'sheepdog' to keep the flock together and heading in the appropriate direction. Errant individuals may need nudging or encouragement but not 'harrying'. The first tutors were trained in a pilot scheme (based on PBL principles) which was reviewed and implemented for the larger number of tutors in 1996.

The next hurdle was accreditation by the Australian Medical Council. A 'mock accreditation' was carried out by a team of four colleagues – Richard Henry (University of Newcastle), Greg Whelan (University of Melbourne), locals Derek Anderson (Acting Vice-Chancellor) and John Mack (Chair of the Academic Board). The rehearsal was helpful, and the first two years of the new program were accredited after the March 1996 visit by the Australian Medical Council's team, with Bob Porter (Monash University) as chair. Overall, their report was very supportive.



The presentation on computer of 'the patient' needed to be planned in good time. The theme committees outlined overall expectations and new problems were suggested for further development, to complement and extend the earlier cases.

There were concerns that such an intensive concentration on curriculum development would harm the Faculty's research output, but during the developmental phase the number of successful grant applications increased. Those active in educational planning were particularly successful. At least in part, that increase resulted from better communication amongst staff across departments, as well as between clinical and campus-based staff.

## Implementing the University of Sydney Graduate Medical Program (USydMP)

### 1997: Year 1 of the new graduate-entry program

Because at the time an over-supply of doctors was predicted, the Faculty was permitted to enrol a smaller than normal cohort in 1997 (147) and 1998 (159), in order to ensure that there were no unexpected problems and to provide time for staff to prepare for Years 3 and 4. It is ironic that, only six years later, predictions indicated a significant shortfall of doctors, so that quotas have increased (to 267 in 2005) and new medical schools have been established.

There was great excitement when the new students enrolled. After introduction into the principles and practices of problem-based learning, the computer-based support and an orientation to their clinical schools, they enthusiastically started their first sessions, rapidly immersing themselves in the program. Then and since, students report high levels of satisfaction with tutorials and supporting activities, particularly the 'clinical day'. They are encouraged to join informal study groups. They have access not only to computers and the library, but to relevant practical classes, other learning resources and activities on campus and in the clinical schools. Many pursue interests and participate in hospital or campus-based activities, including clinical work and research.

Throughout 1996 the development and refinement of problems continued, as learning materials were prepared for face-to-face and online delivery. Resources, including the results of clinical tests, images, new learning topics and links to useful information or websites were added to enrich each problem.

The major concentration was on Years 1 and 2. Nevertheless, Years 3 and 4



The Dean (Stephen Leeder) and Ann Sefton with students from the first intake of the new graduate-entry program.

As noted, males had dominated in the undergraduate program (e.g. females were 37% of the class entering in 1990). The first intake of the graduate program in 1997 increased the proportion of females (to 44%), by 2000 it was 54%, and in 2005 it was 61%.

The intake into the new program more closely matches aspects of the demographic profile of NSW. Numbers of students with a rural background have regularly exceeded those in the former program. Around 12% (up from 3%) grew up outside the Sydney metropolitan area where about 16% of 0–17-year-olds in NSW live. Interestingly, the proportion of students with a non-English speaking background (20%) now closely matches the state average (19%). More Indigenous students (seven) have enrolled, compared with 3 in the previous program.

Fifteen international students joined the first intake of 132 local students. The majority were from North America. Academic staff and librarians ensured that appropriate materials were available to prepare for the US or Canadian Medical Licensing Examinations. Adjustments to the timetable facilitated access to the tests. The students later provided helpful feedback on the balance of curriculum weightings in North American schools. In addition, opportunities for elective rotations in North America became available to local as well as international students. The international students so far have been successful in their national licensing examinations and in achieving one of their preferred residency placements.

Since grading no longer applied, honours are awarded to those who complete a supervised research project, provided they had a 'clean' academic record across all themes. Applicants identify a supervisor, and submit to the honours committee the outline of a laboratory, clinical, educational or community project. The resulting report is marked by two independent examiners. About 15% of the graduating class is awarded honours.

### Issues in the overlap period

Staff were concerned that there might be difficulties between the predominantly international students completing the former undergraduate-entry program and students in the graduate-entry group. Individual students interacted well, but there were some tensions: most undergraduate-entry students rejected any sharing of the new program's learning activities, although staff felt that they would benefit. The undergraduate group sought access to the electronic facilities; resources were provided, but the benefit was limited because the organisation of the courses was so different. International students were keen to ensure that NSW intern placements would be available since North American placements start mid-year. Fifteen John Flynn scholarships were offered for students to experience rural practice during the long vacation. All but one of those selected were from the new program.

## Overall design and implementation of Years 3 and 4

Many clinical school staff were familiar with the content of the first two years; they had provided materials for the study problems, writing learning topics and designing weekly activities for the Patient and Doctor Theme. Clinical School Associate Deans had encouraged them to participate. Once the outlines of hospital-based activities for Years 1 and 2 were clear, they turned their attention to Years 3 and 4.

At well-attended workshops, broad outlines of topics and appropriately progressive activities were agreed, reinforcing early learning and introducing new issues. Early in planning, clinical staff considered new approaches to teaching students whose knowledge, skills and experiences would differ from previous cohorts. One obvious result of their early engagement has been an enhanced understanding and a strong sense of 'ownership' of the whole educational process, supporting vertical integration.

The principles of Years 3 and 4 include 'situated learning' that focused on patient care in hospitals and other settings. The planning required a matrix approach, with attention given both to the detailed, discipline-based clinical content and to specific experiences within each attachment or rotation. As well, an overview was superimposed to ensure a progressive development of knowledge and skills from the perspectives of the four themes.



Students learning clinical skills at Hornsby Hospital

From a series of iterative discussions, more sophisticated clinical problems for Years 3 and 4 were identified. Some reinforce and advance the students' existing understanding; in others new, more complex issues are introduced. A novel version of IT-supported problem-based learning was developed for Years 3 and 4. Based on the educational literature, a computer-based framework was developed to model diagnostic reasoning. In turns, a student prepares information and presents a patient whom he or she is clerking. The guide helps the students' thinking. In tutorial discussions, group members are encouraged to share and apply their individual clinical experiences.

Some clinical departments including surgery, paediatrics and obstetrics – have appointed individuals with educational expertise to contribute specifically to curriculum development and delivery of the new program.

The Australian government now requires that a minimum of four weeks of clinical training is spent in a rural setting, and students arrange to spend that time in the Rural Clinical School during Years 3 and 4. Rural experience is offered in Dubbo, Orange, Bathurst and Broken Hill and surrounding areas, as well as in Lismore in the Northern Rivers region of NSW. Students value the experience and some seek additional opportunities to spend up to one year or more in rural settings. Tensions are emerging because of strains on rural practitioners. In Dubbo, the workforce – largely Visiting Medical Officers rather than staff specialists – is currently below strength.

Intern placement no longer depends on academic results, but on a ballot after preferences are indicated. More final year students now seek rural placements after graduation.

## Integrated clinical attachments in Year 3

For most of Year 3, in 'integrated clinical attachments', students are assigned to a team in a ward or unit. Within legal constraints and under supervision, they participate actively in patient care as a junior member of the clinical team. Some placements are mandatory, while others depend on local availability and the students' preferences or interests. Given the diversity of hospitals to which the students are attached, both in urban and rural environments, it was acknowledged that there would be considerable variability in their experiences, from highly specialised to general. Nevertheless, core learning goals were established to define expectations common to all attachments.

The planning required a matrix of committees, with attention given to the detailed, discipline-based clinical content and clinical experiences within each attachment or rotation. Each of the four theme committees ensured a progressive development in knowledge and skills from its relevant perspective.

The new problems are designed to meet the goals, to deal with issues agreed to be essential or highly desirable, to reinforce prior learning and to introduce more sophisticated concepts. Since the focus of the students' learning is 'hands on', no more than the equivalent of one day each week was reserved for formal teaching. The sessions ensure not only some consistency in content, but also support the systematic development of skills. A 'core' curriculum, including problem-based learning cases, was developed by the Year 3 clinical departments, to continue and extend the learning from the first two years.

The major emphasis in terms of the students' time, however, is on the ward-based team activities. Supervisors report on the students' progress. Some formal teaching sessions are scheduled, including SCORPIO (Structured Clinically-oriented Objective-Referenced Problem-based Integrated and Organised) sessions, which include opportunities for self-assessment. Pioneered by David Hill, the sessions are highly regarded by students and have been adopted in Dentistry.

Half way through the attachments in Year 3, a formative assessment gives students guidance on their progress. A final summative assessment is held at the end of the attachments, including written papers (multiple-choice questions and modified essay questions) as well as clinical examinations (Objective Structured Clinical Examinations – OSCE – and observed interviews).

Each theme group develops tutorials, discussions and activities including student presentations. Appropriate IT support is provided.

The Basic and Clinical Science Theme focuses on experiential learning at the bedside. Problem-based learning tutorials are initially prepared by a student with the aid of a computer-based system. Activities include discussions and some formal sessions. Students are given a focused exposure to Dermatology, Ophthalmology and Ear Nose and Throat.

In the Patient and Doctor Theme, much of the learning results from the attachment to a ward team. Additional use is made of the very successful communications unit at Royal North Shore Hospital, as well as skills centres in each clinical school.

Issues from the Community and Doctor Theme are relevant to aspects of care – including population screening, health promotion, issues in prevention, and care for particular groups. Important community health or social issues are presented and discussed interactively.

In the Personal and Professional Development Theme, students are encouraged to reflect on their progress and identify their strengths and weaknesses, particularly as members of the clinical team. A particular focus is on developing more advanced skills in evidence-based medicine in the context of individual patient care. A novel strategy has been developed as the student refines and answers an appropriate evidence-based medicine question relevant to one of their patients. An oral presentation – often very sophisticated and professional – is made to clinical staff and fellow students. Other aspects include ethics in clinical work and research, professionalism, and debriefing after critical incidents.

### Years 3 and 4: Clinical rotations

Initially, four rotations of 11 weeks were designed: Community; Women's and Children's Health; Psychological Medicine; and the fourth as an Elective in which students could choose to participate in clinical or scientific activities locally, elsewhere in Australia or overseas. Evaluations from students and staff demonstrated that workloads were difficult to manage, and the elective was too long. The decision was made to revise the pattern to make the workloads more even.

The elective was then fixed for all students and now occurs between late December and the end of February, between rotations 1 and 2. Four rotations, each of nine weeks starting from October in third year, introduce students to aspects of practice in a range of settings. All have clear objectives; they are organised to develop both clinical knowledge and skills and include relevant elements from each of the themes:

Psychological Medicine and Drug and Alcohol comprises community psychiatry, psycho-geriatrics, paediatric psychiatry and adolescent medicine.

Perinatal Medicine and Women's Health includes obstetrics, gynaecology and neonatology. Dermatology is also taught within that rotation.

Child and Adolescent Health includes paediatrics, paediatric surgery and adolescent medicine.

Community placements includes general practice, rural medicine, geriatric medicine and sexual health medicine. Geriatric Medicine is also included within the third year hospital-based integrated attachments.

Students must complete the mandatory requirements of eight weeks in rural rotations, but they can extend that time up to six months, in order to explore possible future careers.

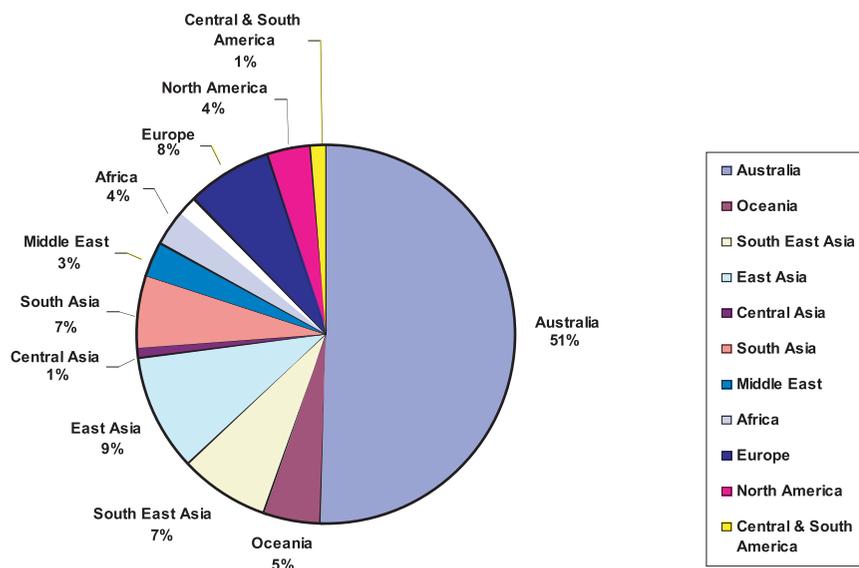
## Elective term

The elective term provides opportunities for students to explore specific interests and or to experience practice in different environments. Students have been adventurous, engaging in practice or research across a range of activities in locations around the world – from high-tech medicine at Harvard to delivering babies in the Solomon Islands, carrying out advanced research, or working in primary health care in an Indigenous community.

At a conference before undertaking their last (pre-internship) term, students come together to report on their experiences based on their elective and or research interests. Sessions are provided to introduce them to aspects of practice as an intern and beyond. It is the last opportunity before they graduate to gather as a whole group.

## Pre-internship term

The final term is undertaken as a supervised pre-internship, with limited formal teaching sessions. Students carry out the tasks of an intern, under supervision, but within legal constraints (e.g. they cannot prescribe). Assessment is based on the performance of a range of tasks undertaken by interns, including demonstrating skills in evidence-based practice.



As can be seen, students have taken the opportunity to undertake electives in a wide variety of settings and geographic locations

## Consequences of the new curriculum



Graduation day

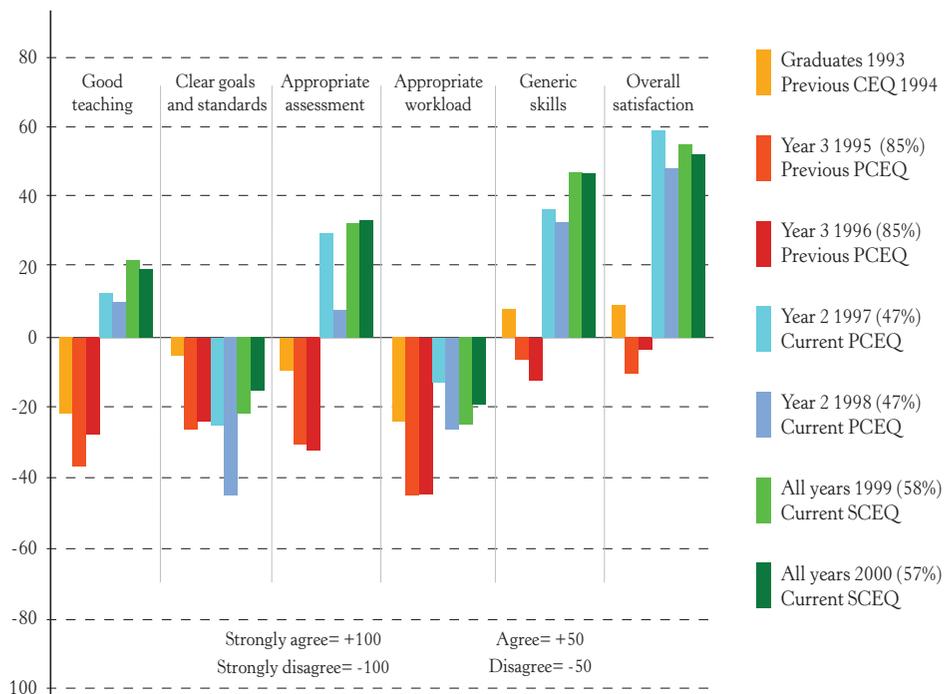
The Faculty had been permitted to enrol lower numbers in the first two intakes in 1997 and 1998. That decision ensured that students completing the six-year curriculum were not disadvantaged. It also provided time to prepare staff progressively for the new and very different expectations and ways of teaching. By 2000 the number of local students admitted was 182, and by 2005 it had reached 232; with the international students the class is now 272 perceived by most to be the manageable limit.

The combined lecture classes in Years 1 and 2 (including dental students from 2001) now exceed the capacity of the largest Bosch theatre, so lectures are broadcast to an adjacent theatre; interestingly, some students prefer those. Work is in progress to provide a larger theatre in the old University Union theatre in Science Road. Videotapes of lectures are available in the library and through the curriculum website, with access to relevant diagrams, graphs and images, allowing students to review the lecture or revise particular elements. Although lectures are no longer the primary learning elements, their quality has progressively improved on the basis of extensive evaluation, to meet the needs of the increasingly technologically experienced students.

The curriculum continues to break new ground in its applications of information technology, making use of the most recent developments to deliver learning materials 'on the run'. Given the range of locations in which students are to be found and the need for most to travel to their clinical schools, a range of initiatives makes it possible for them to review lectures or other information

anywhere, at any time. Personal digital assistants now also contain large amounts of current information, including pharmacological data, readily accessible in wards or practices, or used later for study or review. Chris Liddle is leading the development of audio podcasting, allowing students to hear lectures on an iPod or similar device. With newer models, relevant images (e.g. slides or diagrams) can simultaneously be viewed on its screen and replayed while students are travelling or away from campus. A Sesqui grant from the University provided funds to develop a content management system, calendars, timetables and relevant medical content so that it is readily at hand – particularly valuable in rural areas where library resources are less accessible.

Students in the new program are older than the former undergraduates, articulate, generally more mature and capable of self-directed learning. Students in difficulties are offered targeted help and



Annually, Australian university graduates are required to fill in a Course Experience Questionnaire (CEQ) on their educational experiences. The Faculty also surveyed students in the program using a modified instrument (PCEQ). The red, orange and yellow bars indicate the responses of students in the Undergraduate Medical Program from the years 1993, 1995 and 1997. Note that the responses are largely negative. The bars shown in blues and greens represent the responses of students in the Graduate Medical Program. Note that over time, the responses are increasingly positive, with the most difficult areas being 'clear goals and standards' and 'appropriate workload', not unexpected in a demanding professional program and a problem-based approach.

support. Completion rates in minimum time are now extremely high – a very real issue in times of scarce resources, squeezed budgets and increasing pressures on academic and hospital staff. Only 19 students discontinued between 1997 and the end of 2003 – nine of them from the smaller international cohort. More Indigenous students are enrolling – seven to date. The Faculty is actively encouraging and supporting their participation.

Students with a health professional background generally perform very well in the early assessments, as do those from medical/biological science programs. Those from social, physical or computer sciences, or arts, take longer to adjust, but reach a satisfactory level of performance at the comprehensive barrier assessment, at the end of second year. Time will tell whether the different prior experiences of students affect ultimate career choices. Very few students have needed to repeat a year, occasionally because of illness or other personal difficulties.

Once they graduate, the majority enter the NSW hospital system as interns. Much of the comment from hospital supervisors is positive, referring to maturity, capacity to see the 'big picture' and to work cooperatively in a team. The graduates contribute actively to educational sessions and to hospital committees, and make constructive suggestions. Some hospital staff are uncomfortable, though, if younger than the intern.

#### Some quotes from students about to graduate, on what contributed to their preparedness for practice

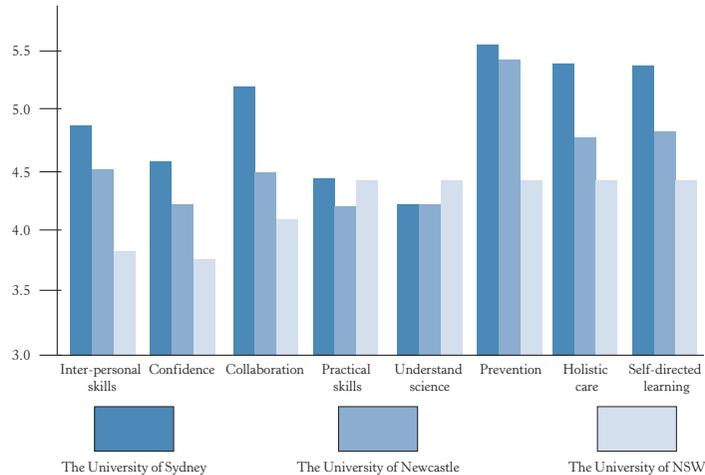
Most commonly mentioned was the clinical experience.

Other comments included:

- a holistic approach
- opportunities to develop practical skills
- hospital experience to complement theory
- PBL and working in a team
- development of personal skills to manage workload
- teamwork and helping each other out

The ratings of interns by Directors of Clinical Training during the first postgraduate year indicate agreement or strong agreement (in around 90% of responses) that the interns are performing well across a broad range of characteristics important for practice at that level.

A comparative study has been published in the Medical Journal of Australia on the performance of interns in NSW as reported by Directors of Clinical Training, and the resulting graph is reproduced here with permission.



The performance of interns in NSW hospitals was evaluated by the Directors of Clinical Training. Note that in two domains: 'knowledge of science' and 'practical skills', no differences were noted. In five other categories, the graduates from Sydney outperformed those from Universities of Newcastle and NSW. In 'knowledge of prevention', Sydney and Newcastle students performed similarly.

## International students in the medical program from 1997

Since the start of the graduate program, 308 international students have enrolled. The new program from 1997 has particularly attracted new applicants from Canada (the greatest numbers, 118) and the USA (62); in the six-year program, only two had ever enrolled from North America. Interest from Singapore (58) and Malaysia (17) has been sustained. Between one and nine students have been recruited from an additional 25 countries. On average two international applicants have discontinued each year. Local discontinuations are proportionally fewer, with no more than an average of two per year (around 1%).

Country	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Canada	1	4	2	7	19	13	26	24	22	118
USA	3	5	6	5	4	7	12	11	9	62
Singapore	4	1	3	7	4	8	6	10	15	58
Malaysia	5	2	1	-	-	3	3	1	2	17
UK	-	-	-	3	1	1	-	2	2	9
Other (24)	2	-	5	4	5	5	6	9	10	46
TOTAL	15	12	17	26	33	35	53	57	60	308

Enrolments by country of international students into the USydMP

## Ongoing issues

Academic records no longer influence intern placements, which are made by ballot amongst all new NSW medical graduates, except in cases of special need. Nevertheless, assessment has remained controversial. Most students and many staff are comfortable with the present pass-fail system which does not rank or grade performance; but ensures that all students reach appropriate standards of knowledge and skills. Collaboration with an international consortium of medical schools will provide access to high quality, validated questions. In addition, increasing emphasis is being placed on modified essay questions that reflect a progressive approach to analysing a clinical problem. An online version is close to completion.

Questions are reviewed for validity and relevance, and all students around the pass level are reviewed in detail by experts before determining whether remediation and re-assessment is warranted. Particular areas of weakness are identified (subject knowledge, key understanding, problem-solving) and expert help is available before re-assessment. A majority of staff and students favour the current practices. Some, however, seek a return to graded passes. The issues are regularly raised and hotly debated. It is a challenge to standardise assessments, given the number of examiners and their different expectations. The diversity of students' clinical experiences also makes standardisation difficult – although clear guidelines and ensuring that there are enough observations by trained supervisors can improve reliability.

An effective evaluation system, largely conducted online, is one of the great strengths of the program. It is a sophisticated development of the original systems. Because of the personal contact between students and staff in tutorials on campus, in clinical settings as well as online, communication is now richer and much more immediate. Potential problems are often identified early and dealt with. Individual, targeted help can be provided.

Formal evaluation is required by the University and students also complete Australian Government questionnaires. Examples of responses are shown in the figures. The improvement in satisfaction since the introduction of the new program is evident, although the open-ended nature of problem-based learning is a challenge to questions concerned with 'clear goals and standards', when students explore issues and identify their own learning needs.

The program has now been running for eight years. Staff have accepted the challenge to ensure that the content remains current and topical, and that new, validated educational methods are incorporated. Feedback from staff and students as well as systematic reviews will help to ensure that the design, content and learning processes remain at the forefront of medical education. When compared with the previous program, students are clearly generally satisfied that their needs are met, although 'workload' and 'clear goals and standards' are both challenging issues in self-directed learning and a problem-based approach.

One ongoing challenge is to identify and encourage students who have a strong commitment to research. Some enter the program with good research honours degrees; they may choose to participate in substantial research during their programs, and some have undertaken combined PhD or MPH degrees. On graduation, the demands of internship and the early years of hospital practice make it difficult or impossible to maintain effective research momentum. The concept of training the 'clinician-scientist' originally introduced into the USA needs some modifications to match the Australian experience. Nevertheless, the Faculty is increasingly aware of the need to support research to bridge from the bench to the bedside, linking to clinical epidemiology and health service delivery.

## AMC accreditation in 2005

In 2005 Faculty documented all aspects of the program. It was successfully accredited for the maximum of 10 years by the Australian Medical Council; a satisfactory progress report in 2010. Highlights of their report included the positives:

- an excellent medical program that meets the objectives required of graduates
- staff commitment to the program
- enthusiasm and resources at rural sites
- excellent electronic resources and networks supporting the students, program and staff
- extensive and detailed review of the material within the curriculum
- an active, ongoing program of evaluation which seeks feedback and input from graduates and employers
- a clearly defined, unbiased and well-publicised admissions policy
- excellent partnerships with the local hospitals, their clinicians and general practitioners to provide teaching and research
- high level of commitment and dedication to support the program from the NSW Health Department and their organisations
- strong support for and commitment to the University of Sydney Medical Program (USydMP) Committee, the subcommittees and their Chairs, by staff and students
- research and publications in the field of medical education
- the work of CIPHE in offering a unique and exciting link with other health sectors to spearhead innovative advances in health
- leading a national project developing core competencies for patients safety education for the health system
- strong leadership and clear organisational management of the Faculty (finances, administration, facilities, IT)
- an excellent Administration Unit, characterised by enthusiasm and professionalism
- active support and promotion of student participation in the design, management and evaluation of the curriculum

Some further development was considered to be necessary in some areas. A broader renewal process was encouraged. With increasing numbers, resources would need to be reviewed, outcomes defined, and criteria developed to distinguish in basic medical sciences between core and supplementary issues. Reviews of the use of PBL in the clinical years and of the Integrated Clinical Attachments were recommended. Flexibility in the curriculum would ensure full utilisation of resources, including rural sites. Some areas of assessment, specifically the long case should be reviewed. Ways to increase the participation of Indigenous students were encouraged and specific support for international students should be reviewed. The committee structures were considered complex; a review was recommended, as was the inclusion of external stakeholders.

## Beyond 2005

By the end of 2000, every year of the curriculum had been implemented and delivered. Now in 2006, the program has been consolidated on the basis of feedback from students, staff and others, and in the context of ever-increasing medical knowledge. In particular, the locally-developed, innovative web-based learning management system is now mature, but it must continue to retain its leadership in an ever-changing technological environment.

A regular, systematic review of each successive 'block' has been in place since the beginning. Problems are reviewed and refreshed, to include new knowledge without overloading the students. The process will continue to ensure that rational change is implemented, and that the learning materials are current. The quality of the assessment processes is consistently enhanced on the basis of experience and effective interaction between staff.

Central management ensures consistency of approaches and expectations. Regular reviews by staff and evaluations from students resolve issues, modify strategies, introduce new evidence-based topics or educational tools, and lead to improvements. The matrix organisation of the various interdisciplinary committees provides mechanisms to effect improvements. New learning issues can be accommodated and tracked, avoiding unnecessary repetition. It is encouraging that the students in the new program are performing well as interns, in comparison with graduates from the other two current medical schools in NSW.

The online communication system and the extensive academic support offered by the web site have been very well received by staff and students. The adoption of the program by other medical schools is another indicator of quality. Students enter with sophisticated IT skills and experience with computer-based learning systems. Few need additional specific assistance, although it is available.

Content knowledge constantly increases, and an inevitable challenge will be to determine priorities and maintain a manageable workload for students. Staff will continue to juggle priorities amongst

teaching, research, clinical work and roles in management within university, hospital or other practice settings. While the current program has been based on the most up-to-date educational evidence and practice, the Faculty must keep abreast of further developments to enhance the program. Effective communication across the Faculty supports rational evolutionary change.

With increasing numbers of students, additional tutorial accommodation for Years 1 and 2 is needed. A planned refurbishment should allow tutorial groups to be reduced to eight, considered the optimal size.

## New combined degrees

A novel approach was initiated in 2005. A small group of strongly motivated and highly achieving students from school was admitted into a combined Science or Medical Science and Medicine program. They were selected using a new, specially designed process that includes a rigorous interview. They must continue to meet strict academic criteria (80% average), and must achieve a satisfactory performance in the GAMSAT. The aim is to provide a small, highly talented group of students with opportunities during their first degree to develop critical research skills across a range of areas, which they will combine later with medical practice and research within the MB BS. They are also required to participate in three additional units of study: Communication in teams; Introduction to clinical research ethics; and Introduction to medical ethics. Six credit points must be achieved in Biology, Chemistry and Physics to provide an underpinning for medical studies.



The Australian Doctors' Orchestra, now a medical institution. It was started by Miklos Pohl, Ben Freedman and Michael Field. Many of the current students share their musical interests.

The first cohort have completed first year, mentored by Merrilyn Walton, meeting the very high performance expectations (over 80% average). They are provided not only with advanced and research opportunities in the medical sciences similar to those offered in Talented Student and Advanced Programs in the Faculty of Science, but they are encouraged to develop advanced communication skills and undertake projects in clinical settings, including the rural clinical school. The second cohort has been selected to enter in 2006.

Two additional combined degrees are to be introduced, providing opportunities for a very small number of exceptional students to continue their interests in Arts or Music while preparing themselves for a medical career. In the past, substantial numbers of students took the opportunity to complete an Arts degree while studying Medicine. Over the years, a number of students in the Faculty of Medicine have enjoyed expressing themselves in music, some excelling in performance. Examples include Miklos Pohl, Michael Field and Ben Freedman whose small campus-based group was a prelude to the subsequent formation of the Australian Doctors' Orchestra by Miklos Pohl. A tribute to Stan Goulston who had run the Medicine and Literature option included highly professional musical performances. **Over the years, an array of rather different musical talent has been showcased in the Medical Revues.**

The music students will undertake their program at the Conservatorium of Music where they will be mentored by a member of academic staff. All students will be supported by a discussion website. No more than 2% of the intake will be selected for these new degrees.

In addition, the possibility of combining the MB BS with the MBA is being explored to enhance opportunities for those who seek to acquire skills in management.

## Supporting ongoing development in medical education

As a direct consequence of the extensive activity that generated the new medical program, three new units have been established to support the program and to extend the educational reach of the Faculty.

### Office of Teaching and Learning in Medicine

With the development of the USydMP, the Medical Education Unit – later the Office of Teaching and Learning in Medicine was born. It had the responsibility of leading the development of the new graduate entry medical program (USydMP). It has had a profound influence. The original design team (Simon Carlile, Michael Field, Jill Gordon and Ann Sefton) was selected as a finalist in the first Australian University Teaching awards in 1997; in the subsequent year an individual national award went to Ann Sefton. The Australian Department of Education commissioned a document in 2000 on the development of the program, edited by Jill Gordon.



Students in a PBL group

As one of the three medical schools in Australia at the time to adopt the graduate-entry model for MB BS education, the USydMP attracted particular attention for the way in which it integrated information technology into a problem-based learning program. That innovation has spawned other developments in health and medical education and has positioned the University of Sydney as a leader in educational innovation.

The most immediate response came from the Faculty of Dentistry: staff explored the possibility of using some of the developments and began their own planning. Much of the Year 1 and 2 curriculum is shared (see Chapter 3). The USyd Dental Program started in 2001.

The Office of Teaching and Learning in Medicine (OTLM) has regularly received many visitors from local and overseas institutions. The Faculty now has both a national and international reputation for its educational developments. The USydMP has demonstrated that the principles of active problem-based learning can be supported by the timed release of information electronically.

Perhaps the most significant indication of the Faculty's achievement is that the University of Sydney program has now been adopted in other medical schools, with modifications appropriate to locale and culture: in South Africa, the UK, Saudi Arabia and two Australian universities. Recently, a major agreement has been signed: for a number of years, a group of students from Saudi Arabia will study at the University of Sydney. Some who meet the criteria will enter Medicine after graduating with their first degrees. Additional international agreements are under discussion.

Ongoing research and innovation in medical education has become a focus, further enhancing not only the reputation of the USydMP but also the profile of the Faculty. Collaborations are now invited by high quality groups overseas with members of the OTLM; staff now author or co-author chapters or papers on medical education, run workshops and are invited to join local and international academic review teams. OTLM has attracted 13 PhD researchers and plans to increase this number to 50 to ensure that the University of Sydney remains at the forefront of medical education. Between 2000 and the end of 2004, members of OTLM have been active in publishing internationally on educational issues. One co-edited book included contributions from OTLM to nine chapters, and an additional 11 chapters in different books were authored or co-authored from the Office. In addition, 56 articles have appeared in refereed international journals

on medical education. Members of the Office contribute to educational conferences and teaching workshops locally and internationally; many new projects are ongoing.

Chris Roberts (from Sheffield) now leads OTLM; he first heard about the Sydney program early in its development by attending a workshop in UK led by a visiting University of Sydney academic (Tim Usherwood).

Within the wider University, the Faculty of Medicine is now seen as a leader in educational development. Members of staff from other faculties are interested in the new directions and seek assistance in modifying their existing strategies in a number of different contexts. New educational collaborations across the University include the Centre for Research on Computer Supported Learning and Cognition (CoCo) to bring together those interested in online learning. The new teaching strategies and the philosophy of integration has profoundly influenced new medical science degree programs in the Faculty of Science. The result has been an imaginative set of new courses that are increasingly attractive to students (see Chapter 3).

Some University of Sydney medical students contribute to educational projects during options, electives or honours work. Following a long-standing University of Sydney tradition, staff and some students are active at meetings of the Australasian and New Zealand Association of Medical Education. It remains a large, eclectic and active association, attracting speakers of the highest calibre.

The University of Sydney staff have also been members of, and have chaired, teams charged with accrediting medical curricula in Australia and New Zealand for the Australian Medical Council. Michael Field is the current chair of its Accreditation Committee and he recently played a major role in providing evidence to the Minister of Education on the effectiveness of new developments in medical education (including problem-based learning) when they were criticised by some professional groups. The Sydney staff selected for review committees are valued not only for their specific subject knowledge and research skills, but also for their educational expertise and experience.

The tradition established with Showcase 99 continues as visitors come from Australia and around the world to observe and review the activities. While such special sessions have been organised, most of the contacts have been less formal, and frequent visitors enjoy observing problem-based learning groups, as well as talking to staff and students about their experiences. Recent visitors have come from Maastricht, China, Taiwan, Japan and Saudi Arabia.

Those active in curriculum design and delivery have been invited to lead teaching workshops locally and overseas, and participate actively in conferences to report on their experiences of educational development and research. Some provide a general perspective, while others offer



A teaching workshop in Sri Lanka

assistance in specific areas of teaching and learning. They are involved in staff development activities in Australia generally, in the local region, and more widely. Recent contributions have included workshops in Singapore, Sri Lanka, China, Malaysia, Thailand and Korea. Particular links have been forged with Vietnam (Hanoi), where there are exciting possibilities for some unique joint developments. Further afield, they

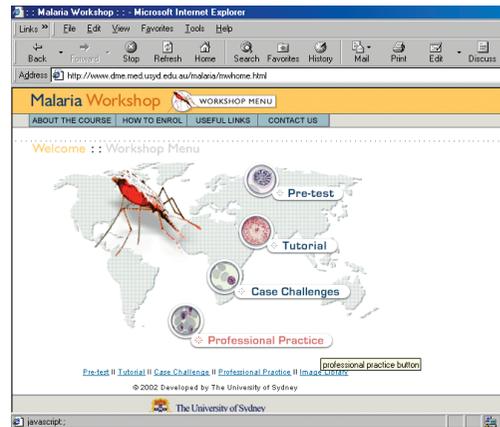
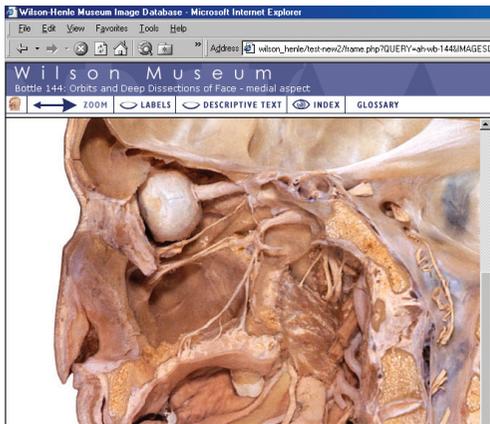
have been invited to advise on new curricula in locations as varied as Kuwait, Berlin, Hong Kong and Vermont (USA). Staff are also invited to contribute to discussions at a range of workshops and conferences.

Now nearly 10 years on from the development of the USydMP, medical education is changing again. The community not only wants doctors but also needs to be assured that they are well trained. Comparative data suggest that so far, the University of Sydney curriculum is meeting the needs of the NSW population. Competency measurement, accreditation and inter-professional approaches to learning all demand new approaches to curriculum, and OTLM is continuing to look to the future of medical education. Curriculum 2010, an initiative of the Faculty of Medicine, is currently considering the next development in curriculum design and teaching and learning.

## Centre for Innovation in Professional Health Education (CIPHE)

As a result of the expertise created within the Faculty during the development of the USydMP, the Faculty created the Centre for Innovation in Professional Health Education (CIPHE). It began as the Project Development Group in the Office for Teaching and Learning in Medicine in 1999 and was formally launched by the Dean in March 2004.

The Director of the Project Development Group and now CIPHE, Tim Shaw, from the former Department of Anatomy, had assisted the Faculty with the development of the online anatomy museum and other online learning resources for the USydMP and other undergraduate programs. As a result of significant external interest in the online developments, he joined the Office for Teaching and Learning in Medicine to lead the group. Using the technology and expertise gained through the development of the USydMP, CIPHE provides quality consultancy services to the health and medical sector. The first project was for the Royal Australasian College of Surgeons who contracted CIPHE to develop Basic Surgical Training online. This represented one of the first ventures in online learning for a professional medical college.



In its short history, CIPHE has handled an impressive array of consultancies for various professional and other training bodies. These include providing pharmacotherapy training for NSW Health, medication management review training for the Pharmacy Guild of Australia, consultancy assistance to a variety of professional colleges in curriculum development and assessment, as well as the development of the National Patient Safety Education Framework for the Australian Council for Quality and Safety in Health Care. Most recently CIPHE is developing workplace-based short courses for organisations such as the Victorian Quality Council.

In addition to its external consultancies, CIPHE has provided assistance to the Faculty and broader University in projects including the development of universal image repositories and in the Sydney Professional Master of Medicine Program (SPMMP). A key feature of CIPHE has been that any knowledge gained from external contracts is applied in the development of Faculty programs.



Through its projects with industry, CIPHE has developed a universal education model for flexible delivery of training into the workplace for busy professionals. CIPHE's activities cover the full spectrum of workplace training levels from vocational to advanced professional training. From its work with professional bodies and training organisations, CIPHE is in an excellent position to focus on strategic initiatives for the faculty.

It will help in positioning the Faculty to respond to new challenges ahead in medical training.

With OTLM's proven skills in undergraduate medical and medical science education, as well as active research into medical education, and CIPHE's expertise in vocational and professional training, the future of both lies in uniting these talents. With OTLM and CIPHE working together, the University of Sydney team aims to be one of the top 10 units world-wide developing and researching health and medical educational research, development and deployment.

## Sydney Professional Master of Medicine Program

Launching in July 2006, the SPMMP is an innovative approach to postgraduate medical education. Employing a unique structure and educational delivery model, the program has the scope and flexibility to meet the professional development needs of a broad spectrum of medical graduates.

With this initiative the Faculty has established a framework for the future development and delivery of postgraduate courses. Based around a modular panel of units across a range of medical specialties, the program can readily be scaled up. In coming years specialist streams will be expanded to cover many of the major medical disciplines and emerging areas of specialisation. With the launch and continuing development of the SPMMP, the Faculty's position as a major provider of medical education in the Asia-Pacific region will be strengthened.

The development of the SPMMP has been a collaborative effort, involving clinicians, researchers, educational experts, project managers and administrative staff from across the Faculty. A central unit provides support to clinicians and researchers to develop and teach units of study, which are delivered primarily online. Students come to Sydney for a short period to start their course and establish personal contact with fellow students, teaching faculty and support staff.

The SPMMP is attracting interest from medical graduates both within Australia and from a wide range of overseas locations including India, the Middle East, Vietnam, Hong Kong, and Myanmar. The modular design allows students to build a program of study to suit their particular professional development needs, both within their chosen specialty and in other areas in which they seek to extend their knowledge and practice. The flexible delivery model meets the needs of busy professionals, enabling them to continue in their practice while studying. Connecting students from around the world with leading clinicians and researchers, the SPMMP also enables students to build an invaluable network within the international medical community.



