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ABSTRACT

Seven articles on higher education and research and development in Australia are presented, along with 12 review articles. "Research into Postgraduate Education" (Ernest Rudd) reviews such topics as admission criteria, student characteristics, form and quality of instruction, and the employment market. "Postgraduate Education Towards the Year 2000--A Changed Role for the Commonwealth Postgraduate Awards Scheme" (Stephen Hill, Ron Johnston) describes a plan in Australia to promote the development of research training. "Examination of Research Theses" (Peggy Nightingale) reviews examination procedures at one university and summarizes examiners' comments on 58 theses. "Supervision of Higher Degree Students--Problem Areas and Possible Solutions" (Ingrid Moses) discusses supervision of postgraduate students. "Ph.D. Education for the Nineties" (D. R. Stranks) addresses issues regarding the doctoral degree in education. "Future Strategies for Research and Development" (Terry Hore) considers the seven research processes by Anderson and Eaton in a review of Australasian higher education research from 1940 to the present. Finally, "General Education Within Professional Education" (M. Marosszeky) discusses the general education component of professional education. (SW)

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Editorial Consultants

Research Into Postgraduate Education

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ABSTRACT
Research into postgraduate education that has made any significant contribution to knowledge is somewhat sparse. This is a selective review of that part of the literature in English that is freely available in Britain. Major topics covered include: admission criteria, student characteristics, form and quality of instruction, success and failure, finance, students' contribution to research, and the employment market.

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The main difference between research into postgraduate education and that into other branches of tertiary education is that far less of it has been done. The topics covered, however, have mutatis mutandis been similar, and in both cases the research is largely policy oriented in that it is either avowedly intended to illuminate policy issues or has some bearing on these. At both postgraduate and other levels, the amount that is written about universities and colleges, their students, their purpose, etc., that is in no sense research far exceeds the amount that has at least some tenuous basis in research. Such philosophical musings, expressions of opinions, however sound, and general pontification are, as far as possible, ignored here. In this survey I shall be looking at those of the more significant contributions to knowledge about postgraduate study of which I am aware. The absence of any writings from this survey can be due to (a) my not regarding them as research, (b) my view that they are of minor significance, or (c) my not having read them, perhaps through ignorance of their existence. However, many of the works I cite have extensive bibliographies.

Altnough all the areas for research on postgraduate study are strongly interconnected and have only the fuzziest of boundaries, one can distinguish the following:

- The criteria for admission
- Numbers of students
- The composition and characteristics of the student body (class, gender, motivation, etc.)
- The form and quality of the instruction
- Student wastage, success and failure
- The financing of postgraduate study
- The overlap between research training and original contributions to knowledge
- The interface between the production of higher degree graduates and the employment market
- The history of postgraduate study.

CRITERIA FOR ADMISSION

The first three of these subjects are especially closely inter-related - the numbers applying and the criteria for admission to postgraduate study determine both the number admitted and the composition of the student body, while, at the same time, given the number applying and the numbers who can be admitted, the criteria for admission are likely to be set to ensure that the planned numbers are admitted.

In both Britain and the USA admission to the more prestigious branches of postgraduate study, especially research, at least in the higher quality institutions, is severely restricted. The alternative policy, of allowing unrestricted access to postgraduate study, in the absence of universal

funding of all students, has, in Sweden, led to a rapid rise in student numbers accompanied by a fall in the number achieving doctorates. In Britain, the policies of both the universities and the bodies awarding students' maintenance grants decree that the main criterion for admission is the class of first degree. In the USA, in the absence of any similar, more or less uniform, national system of grading degrees, selectors use grade point averages, the Graduate Record Examination, and similar criteria. Yet I do not know of any recent large-scale study in either country which has attempted to link these criteria for admission with students' subsequent success in postgraduate study.

Perhaps one reason for this is the difficulty of defining success in post-graduate research study. The problem is the number of dimensions on which this can be measured. Some are simple, such as whether the student gained a higher degree, or how long he took to gain it, and some are more complex, such as the extent of the student's contribution, through publications, to knowledge, and whether the successful thesis was marginally passable but pedestrian, or whether it was brilliant. Heiss (1976) refers briefly to the processes of selection, and, for scientists and social scientists in Britain, these were studied in some detail by Whalley (1982). It is a great pity that Whalley's numerous methodological shortcomings (see Rudd, 1983) made the results virtually useless.

NUMBERS OF STUDENTS

The number of students there are, or should be, is an area where writings are mainly polemical, but Swinnerton-Dyer (1982) did attempt to bring together relevant research and to survey the opinions of employers and others. I, too, have discussed the problems briefly in Rudd (1981).

THE COMPOSITION AND CHARACTERISTICS OF THE STUDENT BODY

This has been covered in a substantial number of studies - it is, after all, one of the easier topics. Most of these studies cover the students at only the researcher's own institution. Notable amongst these are Rosenhaupt (1958), Glennerster (1966), and Welsh (1979, 1981 and 1982). A wider study of the characteristics of British graduate students is to be found in Robbins (1963) Appendices 2A and 2B. There are further data in Kelsall et al. (1970 and 1972), Rudd and Hatch (1968) and Rudd (1975). A substantial amount of data on the UK students can be quarried from the annual University Statistics published by the University Grants Committee and the Universities' Statistical Record, though the newcomer to this series should be warned to pay careful attention to the definitions, and especially to changes in these. For the USA, Berelson's path-making study (Berelson, 1960) included data on the students. Other data can be gleaned from a study of students intending to enter graduate schools (Davis, 1964).

At undergraduate level, studies of the composition and characteristics of the students have concentrated especially on (a) the extent of representation of women, working class students and racial minorities, and (b) on students' opinions and attitudes. At postgraduate level, little has been written on the class composition of the students, probably because there is virtually

the same proportion of students of working class origin at postgraduate level as at undergraduate level; at least that is the case in Britain, and, as it is due to a tendency for working class students to opt especially for the study of science and technology, and for more scientists and technologists than arts students to continue their studies after graduation, I would expect to find something similar in other countries. Indeed Robbins (Appendix 2B, Table 65) found a slightly higher percentage of working class amongst the postgraduates than amongst the undergraduates. However, Kelsall et al. (1972) found that working class graduates were more likely to enter courses of professional training for school-teaching and less likely to work for a higher degree or to take other professional training.

The phenomena of relatively small numbers of women and of students from certain racial minorities (notably blacks and hispanics) in postgraduate study have been written about extensively in the USA. In particular, Heiss (1976) discussed the lack of both women and minority students, Adler (1976) and Solmon (1976) looked at women students, and Duncan (1976) writes about minority students. Roizen (1975) makes an especially valuable contribution here. Although she covers the participation of black students at all levels of higher education, she looks at participation in graduate education in substantial detail, basing her analysis on a considerable amount of data. Feldman (1975) adopts a wider approach to these problems too, looking at the way in which marriage affects both male and female graduate students.

Discrimination is difficult to prove or disprove. Most writers simply assume that a relatively low representation of any group anywhere reflects discrimination against that group, and, because they are often right, there is a tendency to ignore other explanations, even those that might be not so much alternatives as complementary, making the analysis complex instead of simple. There is also a tendency to ignore inconvenient facts. For example, virtually everyone ignores the implications and interpretation of the high representation at all levels of higher education of another racial minority, Jews, even at a stage when they suffered the same disadvantages that are frequently put forward to explain the absence of black students, namely being working class, poor, subject to discrimination, and having the disadvantage of not speaking English in the home. It is no surprise that no one has put forward the heretical hypothesis that the relatively small numbers of women working for the Ph.D. represents women's collective good sense.

The study of students' political attitudes - a topical issue in the late sixties and early seventies - had gone out of fashion before graduate students were adequately covered. However the Carnegie studies of higher education in the USA did include two studies of graduate students that included their attitudes and political ideology. One was in 1969 and the other in 1975. They are reported in Fay and Weintraub (1973), Fulton and Trow (1975) and Trow (1977). Taken together, these studies have two especially valuable features - that they compare the attitudes of graduate students with those of undergraduates and faculty, and that they study changes from 1969 to 1975.

Those attitudes of graduate students that have attracted more interest are their reasons for entering postgraduate study, and what they hope to achieve by it. Gropper and Fitzpatrick (1959) looked at this, taking a substantial sample of students at a range of American universities. It is also touched on lightly by Baird (1976) and by Berelson (1960). Heiss (1964) goes into the subject more thoroughly, but only for Berkeley students. In Britain, this topic was covered in Rudd (1975), more lightly in Rudd and Hatch (1968) and also in Welsh (1979). I discussed the implications of our findings in

Rudd (1973).

As one would expect, graduates entering postgraduate courses of professional training mainly do so in order to enter a profession. Most of those entering taught courses emphasise their interest in the subject, their wish to pursue research for its own sake, and their hope of gaining a university post. It should be noted that, at the stage at which these attitudes decide their course of action, that is when they are entering postgraduate study, they have no experience of what it is really like to do research on any scale - a substantial piece of research is very different from an undergraduate research project - so that they are drawn not by research itself but by their image of it, which may be very different.

THE FORM AND QUALITY OF THE INSTRUCTION

In the preface to their book, Katz and Hartnett (1976) say:

> Surprising as it may seem, the student has rarely been the focus of systematic attention in the over one hundred years of graduate and professional training in the United States. Attention has been given to program planning, recruitment and financing, but the attempt has rarely been made to investigate how students turn into competent professionals.

It may be remarked in passing that this comment ignores a number of pertinent questions about how often, and to what extent, the students do turn into competent professionals. Any study of the process of postgraduate education has to confront a number of highly intractable problems. First there is a need to identify what it is all about, what the purpose of the whole exercise is. At this point one can immediately get into very deep water discussing overt aims and other aims as defined and discussed by psychologists and sociologists, with the temptation to be drawn into the development of theory that some find irresistible.

The aims of some taught courses present few problems. If the course concentrates on the technology of the building of a specific kind of bridge, it is reasonably safe to assume it is training engineers to build these. The problems arise at the other end of the spectrum where the student is working for a research degree. The particular piece of research the student is doing will never, one hopes, need to be done again, so one assumes he or she is being trained to do something wider than that specific piece of research. But how much wider? Is he or she being trained to do any research, or research within a defined area, and how wide is that defined area? Many research students will have careers in which they will never do any more research, so perhaps any attempt to assess the quality of the education that research students are receiving should look at wider intellectual gains usable in many different activities and occupations. Some writers, especially in the USA, regard work for a Ph.D. as primarily or solely a training for university teaching, and there has been much discussion, though, as far as I know, not much research, on its unsuitability for this.

One can add to these problems a very considerable measure of disagreement on how a supervisor should go about this task. Some take the view that it is better for students to be left to make all the effort on their own as they will learn more that way. Others believe that they must somehow get students

through, even if it means telling them in detail what they should do at every stage. Most supervisors try to strike a balance between these two positions, but that is not easy, especially as the student is likely, quite early in the research, to know substantially more than the supervisor about the topic.

Other disagreements centre on the extent to which supervisors should encourage their students to complete their research within any finite time. In Britain, the system of public funding of research students for a standard three years, and the considerable difficulty of raising funds for longer periods, make this problem especially acute. A major difficulty for the supervisor arises from the nature of research itself; if it is truly original it has constantly to face new problems to which there are no set answers. The intrinsic difficulty of the supervisor's task is probably the main explanation for the widespread discontent of students with the quality of their supervision. But it is certainly not the only explanation: Welsh (1982) speaks of 'the incompetent, poorly qualified, uninterested, unapproachable, or lazy supervisor'.

A Snoopy poster says 'There is no problem so big that you can't run away from it', and confronted with the difficulty of assessing so complex a function, most of us who do research in the area tend to take the simple way out and concentrate on the easily measurable or assessable aspects of training in research. For example, in Rudd (1975) I have looked at how the students chose their research topics, how much formal instruction in research techniques they received, how often they saw their supervisor, whether they thought their supervision was sufficiently close, etc. In Rudd and Hatch (1968) we explored a little what past students thought they had gained from their studies, and in my forthcoming study of students who took inordinately long over their higher degrees, or dropped out altogether I explore these topics in greater detail.

The form of Jennifer Welsh's study of Aberdeen students has enabled her to make two especially important contributions here. Because she was following a cohort through their period of full-time study she was able to record concurrently rather than retrospectively how the students went about their studies, and so to isolate those features of the students' approach to their research that distinguished the more successful from the less successful. Also, as a member of the University herself, she was able to talk to both students and their supervisors, and compare their accounts - I have always thought that if I, a total stranger, were to attempt this, the students would fear that some of the things they told me could get back to supervisors on whose help they were still very dependent, and that this would reduce their willingness to talk freely to me.

She found, for example, that, though students and their supervisors agreed that some students do not need supervision, they disagreed considerably on which students these were; those students who believed they did not need supervision were not, in their supervisors' eyes, yet ready for that degree of independence. Also she found that students tended to prefer the younger supervisors, to whom they, presumably, found it easier to relate. But these must be less experienced at both research and its supervision, and so more likely to make mistakes of which neither the student nor the supervisor might be aware.

A Swedish researcher who, like Welsh, was a mature student and experienced researcher but making her study in order to write her own doctoral dissertation, has found the problems of postgraduate students in the social sciences faculty at Uppsala to be very similar to those described by Welsh and myself

(oral communication and Sölverborn, 1983). Katz and Hartnett's book represents a wider but more fragmentary study of the development of graduate students, as it consists of a series of loosely related chapters by different authors who had been associated in research. I have mentioned above some of the topics they cover. The range covered by the others can be well represented by the titles of two chapters: 'The Meaning of Quality in Graduate and Professional Education' and 'Emotional Problems of the Graduate Student'.

Further progress in evaluating what it is that the graduate student gains from postgraduate study comes up against the major problem of how to distinguish those changes in the student that are the result of postgraduate study from those that are simply the result of maturation. The apparently obvious answer - to study a cohort of students and a control group over a period - does not look so useful when examined in detail. The insuperable objection is that, when the students have been matched in every measurable characteristic with their controls, there is still a residual but important difference in character that has led the one to enter postgraduate education while the other has not.

SUCCESS AND FAILURE

One of those more easily measurable features of postgraduate study to which I referred above is how long it takes the student to gain the qualification at which he or she is aiming, or, indeed whether he or she ever gains it at all. In Britain, though not in the USA, this is the only topic that has had more attention recently at postgraduate than at undergraduate level. It was one of the subjects to which the Swinnerton-Dyer Working Party gave considerable attention, prompting a number of studies by the research councils of the progress of their award holders, as well as commissioning the sadly flawed study by the Policy Studies Institute. The best figures given by Swinnerton-Dyer (1982) come from the Department of Employment's sample survey of 1970 graduates from British universities and polytechnics (Williamson, 1981). Regrettably this achieved a response rate of only a little over 50 per cent.

The picture shown by all these figures is not greatly different from that relating to 1957 entrants to postgraduate study in Fudd and Hatch (1968), though various differences in coverage and definition make a precise comparison impossible. It is unfortunate that our study still provides the only reasonably comprehensive British figures for a complete cohort.

The overall picture, drawn from all sources, shows a very substantial group who, some seven or more years after they started postgraduate education, had still not achieved the qualifications at which they were aiming. It is with this group that my forthcoming monograph, which is based upon detailed interviews with a small sample of the less successful postgraduate students, is concerned.

THE FINANCING OF GRADUATE STUDENTS

For the UK universities, figures for the sources of students' incomes are published in the annual University Statistics, to which I have already

referred. The adequacy of the students' incomes is more difficult to determine given the widespread wish, not uniquely found amongst students, whatever the level of income, to have more, and the almost equally widespread sense of deserving that extra money. Changes in the percentage of students who consider their finances adequate, eg. the sharp fall found amongst American graduate students between 1969 and 1975 (Trow, 1977), can mean either that students' finance has not kept up with inflation, or that their expectations have changed, or both.

For the USA there is the aptly named classic Stipends and Spouses (Davis, 1962). In Britain the government body responsible at the time for the largest single scheme of support for postgraduate study, the Department of Scientific and Industrial Research, set up a committee to look at these issues. Their report is summarised in DSIR (1962), and research for the Committee is reported in Rudd (1962). A more recent study of postgraduate students' income and expenditure is reported in Dight and Bush (1979).

STUDENTS' CONTRIBUTION TO RESEARCH

The issues that are involved in any discussion of policy on the optimum numbers of first-degree students are more than sufficiently complex; but at postgraduate level there is a further complexity. At first degree level the output of the process is an educated (or trained) graduate; at postgraduate level, in addition to an output of more highly educated (or more trained) graduates there is also an output of publishable research. Even some of those students who do not gain their research degrees publish results, though fewer of them publish, and these publish less per head, than the more successful.

In some countries (eg. Britain) most of the funding is primarily for study, and the research is a by-product. In other countries (eg. Sweden) it is the other way round. Where the funding is basically for study, any cut in that funding not offset by increases in research money results in a reduction in the amount of research carried out. The implications of this have been competently discussed in a number of places, notably Blume et al. (1981) and Hirsh (1982). Remarkably little, however, has been written about the extent and importance of graduate students' contributions to knowledge. I do not, for example, know of any attempt on an adequate scale, to verify the claim that is often made that research students contribute a disproportionate amount of the most innovative research. The lack of any large scale verification does not, however, mean that this claim is invalid. When it was made in respect of branches of history and biology in unpublished papers presented at one of the Leverhulme follow-up seminars, it was, in each case, founded on a small empirical study. The issues raised by the Swinnerton-Dyer Committee did, however, spark off an examination of the amount published by research students in three fields of the social sciences - human geography, political science and economics (Social Science Research Council, 1980).

THE EMPLOYMENT MARKET

Here the problems are very similar to those studied by researchers primarily interested in first-degree graduates. These are well discussed in Catto et

al. (1981) which draws attention to the serious problems in adjusting numbers of graduates to the market for them. One of the common approaches to assessing the market for holders of higher degrees is to interview employers, or in other less organised ways gauge their opinion, for example, by consulting employers' organisations. Such approaches are to be found in Swinnerton-Dyer (1982), Izatt and Parsons (1979), Keys (1979) and Brown (1982). Their main weakness is that, even apart from the difference between the views of the most heavily science-based industries at one extreme and of those making little use of science at the other, one finds that there are strongly held and widely differing opinions on the usefulness of holders of higher degrees, even within the same firm, so that the results of the research depend very strongly on whom the researcher happens to talk to.

An alternative approach is that of the economist who judges the demand for higher degree graduates by the size of the salaries that employers offer them, and compares the various capital costs of gaining the degree with the increase in income it produces, in order to calculate a rate of return. However, virtually all the calculations of a rate of return apply very specifically to first degrees. Perhaps this is just as well, since the figures reported by Williamson (1981) show that, at a fairly early stage of the career, the overall rate of return from a higher degree in Britain is negative - graduates earn less than their contemporaries who went straight into employment.

Swinnerton-Dyer (1982) argues that these results do not give an adequate indication of the value employers put on a higher degree. Later in their employment, higher degree graduates' salaries may rise relatively to those of other graduates. It would not be surprising if this happened, as the higher degree graduates are, at the point at which they enter their postgraduate studies, a highly select group. However, I am not persuaded of the soundness of the argument that a later relative rise in earnings, as the graduate gets further from his studies and as his earnings come increasingly to reflect his work experience and his abilities, can safely be attributed to the influence of the higher degree.

Studies of the employment of higher degree graduates tend to concentrate disproportionately on the scientists, and therefore are to be found, by the assiduous, in the publications of official bodies, or quasi-official bodies, with a concern for science policy, such as the National Academy of Sciences in Washington.

One respect in which higher degree graduates in general, and the holders of doctorates in particular, differ from first-degree graduates, is in the strength of their preference for one kind of employment alone - teaching and research in universities. Given this preference, it took no great powers of prescience to make our (Rudd and Hatch, 1968) predictions that, when the rapidly rising numbers of higher degree graduates emerged in the seventies to find far fewer university jobs, there would be problems. A far more thorough study of the job prospects for Ph.D.s carried out for the Carnegie Commission on Higher Education, Cartter (1976) came to a similar conclusion.

A less useful contribution on this issue is made by Solmon et al. (1981). They set out to show that Ph.D.s who want to be university teachers can find useful and interesting jobs elsewhere. Their very selective survey of people in some of the more interesting jobs finds, not surprisingly, that there are Ph.D.s in interesting jobs outside the universities. Many of these jobs do not require a Ph.D. and Solmon et al. fail to give adequate attention to whether the people in them might not have been better off if they had not put time and effort into gaining the Ph.D.

HISTORY

Books on the history of universities abound but they generally say little about postgraduate students. Books on postgraduate study, however, such as Berelson (1960) and Rudd (1975) sometimes include a history chapter. There is a summary of recent history in Katz and Hartnett (1976). The definitive study of postgraduate education in Britain, up to the introduction of the Ph.D. immediately after the 1914-18 war, is Simpson (1983). Those who want to look further into the history of graduate study would be well-advised to search the specialist history journals.

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Postgraduate Education Towards the Year 2000 —A Changed Role for the Commonwealth Postgraduate Awards Scheme (1)

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ABSTRACT

Ph.D. research training in Australia only came into existence after World War II. It grew slowly until the late 1950s when The Commonwealth Postgraduate Award (CPRA) Scheme was introduced to promote the development of research training. The scheme has had an extensive impact on research training, supporting over 700 new students a year by 1982. However, no serious evaluation has been made of the Scheme and whether in the changed circumstances of the 1980s it needs to be revised. The present article reports some of the key results of the evaluation that the Commonwealth Department of Education commissioned. This study has shown that the CPRA scheme achieved its original objectives: to develop postgraduate research schools; to maintain a flow of highly trained personnel to the workforce; and to promote the full intellectual development of the most talented students. But it is now operating in a new context where the conditions of expansion of the 1960s no longer exist and stronger pressures for relevance are being exerted on university research. In short, education policy and research policy have come into conflict, the result of which is new pressures on research education in general and the CPRA scheme in particular. Solutions to this conflict are proposed, involving no radical alterations of the scheme, but the trial introduction of a pluralist approach to postgraduate support which leaves the present scheme intact but meets the new demands the changing context is placing on postgraduate education.

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INTRODUCTION: THE CONTEXT FOR RESEARCH EDUCATION IN THE 1980s

The PhD degree is a relative newcomer in Australian tertiary education, the first degrees being awarded after World War II, in 1948. However with the post-War acceleration of a scientific and technological age, it has become the exclusive symbol of research competence, and the capacity to contribute as an expert to the knowledge pool of late 20th Century society.

Even after the PhD was introduced, Australian tertiary education was slow getting high level research education off the ground, based as it was on a traditional cultural cringe to overseas universities for higher level education. Just twenty-one years ago (1963), about the time when students who are entering PhD training today were born, only 174 new PhD graduates graduated in the whole country.

The first strong public expression of the inadequacy of arrangements for postgraduate education and of the need for their development was provided by the Murray Report, commissioned to examine the state and organisation of Australian universities.(2) Australia's potentially disadvantaged position in the world economy was recognised, as was the nation's responsibility to contribute to the general growth in scholarship and knowledge. It was this concern that led to the recommendation that a Commonwealth Postgraduate Research Awards (CPRA) Scheme should be established to nurture postgraduate training. The CPRA Scheme was subsequently established, following government legislation, in 1959, with three key objectives:

(a) To develop postgraduate research schools in Australian Universities;
(b) To maintain a flow of highly trained personnel to the workforce;
(c) To promote the full intellectual development of the most talented students (3).

Times have changed since then. There has been an enormous growth in postgraduate research education: all higher degree enrolments have increased from 2226 in 1959 to 24,630 (4) in 1982, whilst PhD enrolments have increased from 1122 in 1961 to 7021 in 1982.(5) In support of this growth, the CPRA Scheme has been expanded by a factor of seven - from 100 awards in 1959 to 735 awards in 1983. But whilst the output of PhD graduates and the availability of CPRAs have expanded dramatically, a number of serious strains are now evident in the system - strains which are directly attributable to the collapse in expectations and the scramble for scarce resources that have followed the years of recession and unemployment difficulties. A postgraduate degree no longer necessarily commands jobs marked by higher remuneration and personal autonomy, particularly in the professions where employers offer very little, if any, salary premium for higher degrees. The traditional major employment for PhD graduates, in institutions of higher education, has dried up as a result of the 'steady-state' funding of the past few years. The financial value of the CPRA fell (until 1983) so dramatically - quite literally to below the poverty-line - that many academics claimed that the best students were seeking employment rather than suffer CPRA penury for an uncertain future. Meanwhile, with 'steady-state' funding, many academics also are claiming that the availability of research funds has seriously shrunk, making it very difficult to provide adequate equipment and resources for post-graduate training. In the 1980s, postgraduate research education is caught in an environment of uncertainty and conflict.

However, what is clear about these conflicts and uncertainties is that they stem from a tension, that has not been recognised up until now, between the two principal functions of universities: "the preservation and transmission of knowledge by teaching, and its extension by research". (6) While teaching and research remain compatible objectives, the distinction between the requirements of each is minimised within the university system. But when they come into conflict, postgraduate education is placed under a particular strain because of the extent to which it straddles the boundary between the two functions. This is what has happened over the last few years. The context for postgraduate education has changed dramatically from what it was when the CPRA scheme was introduced and nurtured in the early stages of the 'golden age' of university expansion of the 1960s.

The very considerable expansion of higher education in the 1960s and early 1070s was a consequence of the acceptance by the Governments of the day of the principle of higher education on demand. The justification rested not only on meeting individual aspirations but also the value of higher education as an investment in economic and technological progress.(7) The combination of these economic and social arguments proved sufficiently persuasive for the number of universities to be expanded from ten to nineteen. Moreover a comparable growth in the research capability was unquestioned, indeed welcomed. If the utilitarian argument was persuasive for higher education, how much more powerful and evident it was for research, particularly scientific research.

This expansion had a multiplier effect on postgraduate education, for, with the link between teaching and research objectives, the mass recruitment of academic staff spawned a mass demand for research students to assist academic research and careers. Moreover, a postgraduate degree was, almost without exception required for entry into this attractive occupation. This was fine in a continuous growth market, but as soon as the funding growth was restricted, it caused a serious over-run. Private industry was at the same time pulling out of research in Australia, and, whilst retaining some interest in PhD engineers, never recruited more than 10% of the total PhD graduate population leaving the universities.(8) So, academic posts became immensely competitive, at a time when unemployment in the wider economy was becoming a serious problem.

More generally the problems posed for postgraduate education can be seen as largely a consequence of the unplanned severing of the nexus between higher education policy and research policy which existed under conditions of expansion. Within higher education, research funding has placed the resources of the universities, including the resources for research, (which come predominantly from the same source), under ever greater pressure.

At the same time, having accepted the utilitarian arguments of the scientists, governments, in the context of the state of the national economy, have increasingly demanded to see the results of their investment. Through their science policies, governments have sought to direct research towards national problems and objectives so as to ensure the maximum return on their investment in research. In addition, a recognition of the vital strategic economic role of specific new technologies such as micro-electronics, robotics and biotechnology has led to increasing exhortations and organisation to mobilise research resources to these ends.(9)

Unfortunately these demands on the university research system arising from science policy are hitting the institutions at a time when they are least able

to respond - because their capacity to respond has been seriously reduced by higher education policy decisions taken quite independently of their science policy implications.

Both technological/economic objectives and postgraduate education are at risk because the two functions are not integrated. Yet the university system appears to be rigidly opposed to allowing such an integration at the level of postgraduate training where it most matters. The Universities' Vice Chancellors appear to see response to the conflict between objectives as a threat to their own core value of "university autonomy".(10) Through their vested interest in 'things-as-they-are', and by their conservatism they are likely to exacerbate the confusion and inefficiency surrounding postgraduate research education resulting from the unexamined effects of this new context. Therefore, unless some changes in policy are introduced, many students are likely to continue being educated in areas for which there is little employment demand; national technological and utilitarian objectives are likely to continue to go unachieved, and the universities' independent 'critical' and reflective functions will be not strengthened but eroded by university conservatism.

The CPRA scheme stands right in the middle of these conflicts, for this is the primary national scheme for providing support for postgraduate research education, and sets the pattern for university-based schemes. The concept of the scheme has not changed since its inception; nor has it been subject to serious review. Yet as a policy instrument, it needs to be shaped by a recognition of the tension between education and science policy objectives which is traumatising the higher education system.

It was this changed context which gave extra weight to the invitation by the Commonwealth Department of Education to review the CPRA scheme.

THE RESEARCH STUDY

Specifically, our brief in evaluating the CPRA scheme was:

(a) to investigate and establish the process of the present 'Awards system';
(b) to examine the effectiveness of the present Awards Scheme in achieving its objectives;
(c) to examine the appropriateness of the present objectives of the Awards Scheme, and to explore the advantages and disadvantages of alternative policies.(11)

The study was conducted from late 1981 through to the time when it was written up in early 1983. It was continuously monitored and guided by a Steering Committee established by the Department of Education and which included representatives of the most interested parties, ie: the Australian Vice Chancellors' Committee, the Australian Conference of Principals of CAEs, the Council of Australian Postgraduate Associations, the Office of the Commonwealth Tertiary Education Commission, as well as the Commonwealth Department of Education and an external research consultant.

In the present paper, the space available for presenting our research and funds is limited, so, with but a brief outline of our methodology, we will

concentrate on the findings and recommendations that most directly impinge on the education/research policy nexus. For it is here that the most significant changes are called for, if universities are to continue to play a central role in Australia's social and economic wellbeing past the 1980s.

From our preliminary work in the study, it quickly became apparent that the research could not be done from published data alone, because much of what we needed to know came from what was happening 'now', from detailed information about the students, their backgrounds, experience, expectations and so on, and from a detailed understanding of the educational/research climate within the universities. So, basic to our approach was the use of previously collected aggregate and statistical data as a framework which could be fleshed out and made meaningful from interview data. The study was also comparative; although our brief was to study the CPRA scheme and students, this would not make much sense unless we had comparative samples of non-CPRA students. So both comparative analysis, and a synthesis between statistical and interview data were built centrally into our design.

Thus we sought data from a variety of sources. Existing data were drawn from:

- The Department of Education in-house longitudinal study of students commencing in 1965 and 1966 (conducted in 1976), the 1977 review of attitudes towards the CPRA scheme from interested bodies (published in 1980), and the comparative study of CPRA holders with non-Award holders commencing in 1974 and 1975 (conducted in 1982);
- annual statistics published by the Department of Education on the Postgraduate Award scheme; from the Australian Bureau of Statistics on Universities; and from the Graduate Careers Council of Australia on employment of graduates;
- reports produced by the Council of Australian Postgraduate Associations on various aspects of postgraduate education, and reports on tertiary students' finances;
- policy reports on postgraduate education in other countries, particularly the eight countries studied in OECD - Canada, France, Japan, New Zealand, Sweden, United Kingdom, United States of America, Federal Republic of Germany.

New Data were collected by:

- early 'sensitising' interviews with postgraduate students, selected Vice-Chancellors, the Commonwealth Postgraduate Research Awards Committee, Department of Education administrators, university professors, chairpersons of university Graduate Studies committees, CSIRO and industrial research personnel, and members and staff of science advisory and funding bodies - ASTEC, Department of Science and Technology, ARGS;
- a survey of all Australian University Registrars (or equivalent) on the process by which CPRA's are awarded at each institution;
- a survey of Australian Research Grant Scheme grant holders (representing the present elite research community in Australia) on the contribution of CPRA's to their careers and present research effort;
- a policy survey by one of the authors (Professor Johnston) of overseas postgraduate educational practice, conducted by interview in Canada, the United Kingdom and the Federal Republic of Germany;
- a survey of key Australian opinion-leaders - amongst graduate students, and in universities, industry, and government, of reactions to policy

alternatives recommended in this report;
- the commissioned preparation of previously unpublished data on longitudinal employment statistics by the Graduate Careers Council of Australia;
- a major interview survey of postgraduate students in Australia.

The interview survey of postgraduate students was the centrepiece of the overall project. Its primary purpose was to obtain detailed information, related to the major objectives of the study, on the experience and expectations of postgraduate research students. These data were used to flesh out the broad-brush statistical information available through ABS, CTEC, and Department of Education data on, for example, completion rates, enrolments and employment.

A preliminary open-ended questionnaire was developed and pilot-tested on a small sample of students (18) at the University of Wollongong. This was followed by a full pilot study of postgraduate research students at the University of Wollongong. With minor adjustments this questionnaire was then used as the interview format for the main study. Because an interview was essential to obtain the data sought, and the variability and incompleteness of university records made construction of a population impossible, an approach of 'criterion sampling' was used in selecting students for interview, i.e. 'criterion' universities were selected to represent the range of institutions in the country: i.e.; Sydney University to represent a large, long-established, traditional university in a major metropolitan area; Monash University to represent a medium-to-large, newer, technologically-based university in the outer suburbs of a major metropolitan area; Flinders University to represent a small university, physically isolated to some extent from the major research and industrial centres of the East Coast; and Wollongong University to represent a small provincial university with a close identification with the needs of its particular region. Within these institutions 'criterion' discipline areas were selected to represent broad discipline groupings - Humanities, Social Sciences, Natural Sciences and Applied Sciences. Then all students in these Departments were contacted for interview. This approach allowed us to develop samples of students supported by CPRA's, students supported by University and other forms of Award, students not supported by Awards but studying full-time, and students studying part-time. Thus we could compare CPRA holders against a range of other types of student. In total 319 postgraduate students were interviewed at Sydney, Monash, Flinders and Wollongong Universities.

Across all institutions and departments we were able to draw a 61% sample from the populations identified (the residual being uncontactable etc) and were able to interview 64% of those people identified. We checked very carefully for potential bias in the sampling (12), and where potential bias could have occurred, took this into account in interpretation of our findings.

THE PRESENT CPRA SCHEME AS A CONSERVATIVE FORCE

Several obsrvations stand out about the way the CPRA scheme has operated since its inception. But they basically boil down to the fact that the system has been guided by one rather loose principle, that a proportion (undefined) of the best undergraduate students (as measured primarily by grade of Honours degree) should get some support (undefined) to complete post-graduate research

training, no matter what discipline they are in, or the nature of their proposed research education'. Consequently, the financial value and the number of awards has fluctuated widely and thereby introduced considerable uncertainty into post-graduate support. With awards going into disciplines and departments according to student demand, the system has been effectively disconnected from either education or research policies for the development of the tertiary sector. The result is an unintentionally conservative postgraduate education system.

Effects of Fluctuations in Numbers and Values of Awards

The number of CPRA research awards varied inconsistently from year to year. As Table 1 demonstrates, the number increased from 100 in 1959 to 725 in 1974, but then dropped sharply by 23% in 1978, before increasing again in 1983. But there was no consistent rationale for these changes, except for a rather loose argument of the need for more, or for less, research students. The major determinant appears to have been the pressure of other priorities at Budget time, rather than the needs of postgraduate education. The changes remained unguided by a benchmark such as a fixed proportion of full-time post-graduate enrolments (CPRAs as a percentage of this benchmark fluctuated from 18% in 1961 to a peak of 42% in the early 1970s before declining to about 30% at the start of the 1980s). Equally, the number of CPRAs distributed is not guided by the number of applicants or the quality of candidates.(13)

The scheme has changed over time in the financial value of research awards. But, relative to any comparable wage scale (for graduates), the value has fluctuated widely - though from the early 1970s always down, until a substantial increase in 1983 brought the CPRA back above the "poverty line" it had fallen below at the end of the 1970s (See Figure 1).

Consequently, in both numbers and values of awards, as well as in the fact that no substantial review has been conducted previously, it is clear that the CPRA scheme has largely been left to wander along by itself with no particular changes except when political pressure suggested the number or value should be adjusted another notch or two. It is not all that surprising that neither the number or value of awards have been indexed, as most governments wish to avoid binding themselves into an inflexible financial disbursement. But the effect on an ununionised, powerless but vitally important element of the labour force is clear - in the irrational fluctuation that time-graphs of its progress reveal, and also in the heartfelt cries of genuinely poverty-stricken research students - the best minds in the country - who we talked to during our study. To quote one, whose statement represented many:

> After two to three years you feel you're not living a normal life, and become envious of others' resources. You ask yourself, 'have I done the right thing - living as a pauper'. The main effect, I find, is being demoralised about doing your research.

The effect has been to deter students with the best results within the more 'professional' disciplines - where external employment is earier to obtain - from continuing into research training. In one Psychology Department for example, every First Class Honours student found a job immediately, leaving only Second Class Honours students applying for CPRAs. At the other end of the spectrum, the disciplines where employment prospects were the most limited had the highest retention rates for Honours graduates, and so accumulated a

Figure 1

COMPARISON OF CPRA WITH RESEARCH ASSISTANTS' AND TUTORS' SALARIES, AVERAGE MALE EARNINGS AND THE 'POVERTY LINE'

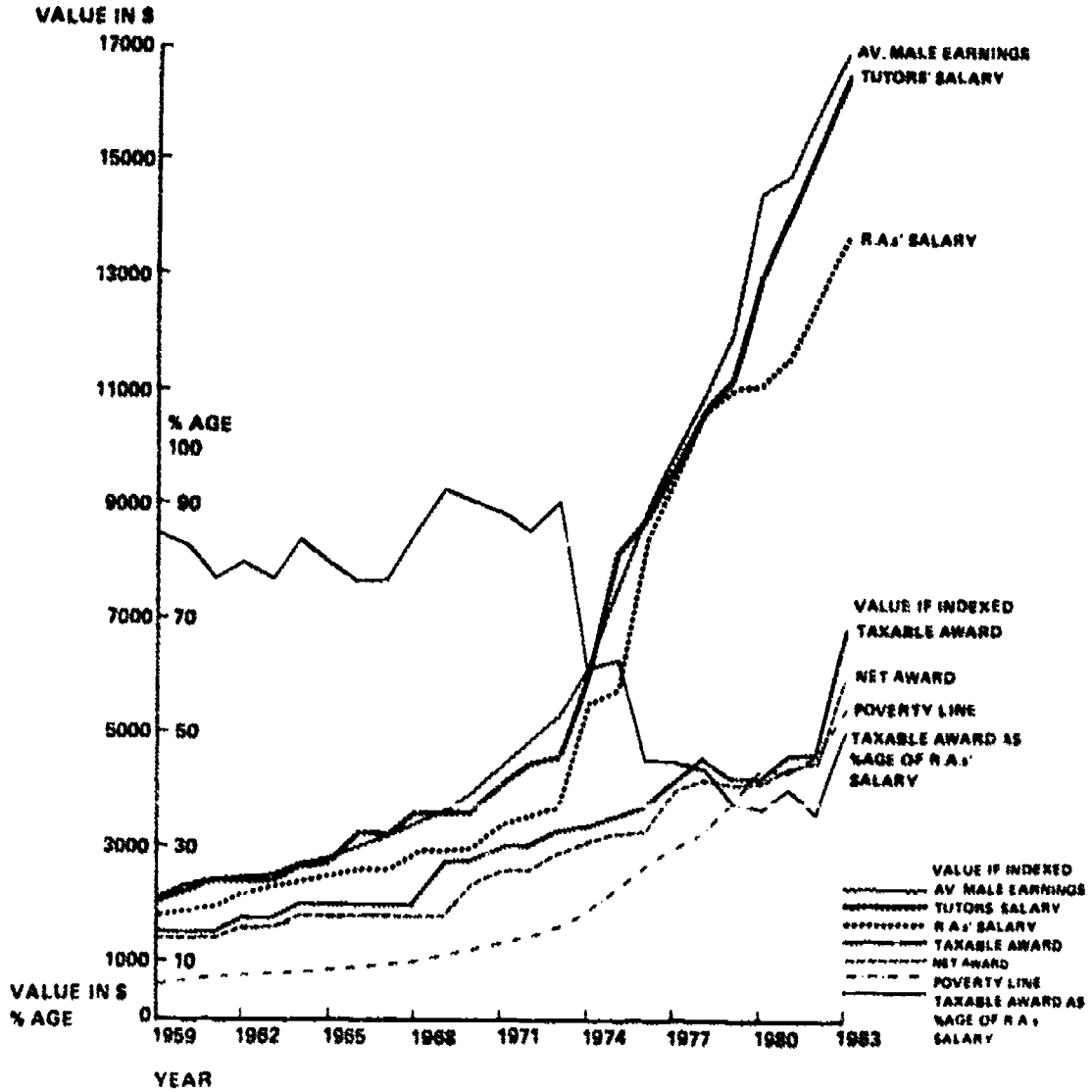

TABLE 1

Commonwealth Postgraduate Awards 1959-1983

Number and Value of Awards, Number in Training and Proportion of Scholars

Year	Value of** Award in $	Total No. * of New Awards	Total No.* of Awards	Research		Course		Research Scholars as a Proportion of all Enrolled Research Students	Postgraduate Award Scholars as a proportion of H/D Students
				New	In Training	New	In Training		
1959	1400	100	100	100	100			4.5%	4.5%
1960	1400	100	173	100	100			6.2	6.2
1961	1400	100	217	100	217			6.8	6.8
1962	1600	125	266	125	266			7.0	7.0
1963	1600	225	340	225	340			7.0	7.0
1964	1800	225	469	225	469			8.7	8.7
1965	1800	300	634	300	634			10.3	10.3
1966	1800	400	874	400	874			11.6	11.6
1967	1800	500	1179	500	1179			12.8	12.8
1968	1800	500	1372	500	1372			14.9	14.9
1969	2350	650	1629	650	1629			15.5	15.5
1970	2350	650	1730	650	1730			19.4	15.0
1971	2600	800	1955	700	1857	100	98	19.2	15.7
1972	2600	800	2055	700	1930	100	125	19.7	15.8
1973	2900	800	2055	700	1931	100	124	19.6	14.9
1974	3050	875	2129	725	1953	150	176	19.4	14.0
1975	3250	875	2191	725	2006	150	185	18.8	13.2
1976	3250	875	2183	725	2001	150	182	18.1	12.4
1977	4000	780	2201	635	2006	145	195	17.5	12.0
1978	4200	680	2022	555	1840	125	182	15.7	10.6
1979	4200	680	1881	555	1717	125	164	14.3	9.5
1980	4200	680	1816	555	1652	125	164	13.5	8.8
1981	4620	775	1831	635	1665	140	166	13.4	8.4
1982	4620	753	1984	635	1798	140	186	13.9	8.5
1983	6850	900	-	735	-	165	-	-	-

* CAE Awards have been excluded.
** Value converted to $ for years prior to 1966.

SOURCE: AVCC, Table 3, p.13, unpublished submission to Dept. of Education, 'Review of Need for Postgraduate Awards, 1980.'

CAPA submission Table 6, p.174, 'Postgraduate Finance', a Submission to the AVCC Inquiry into Student Finance, September 1982.

Figures for 1978 to 1982 from ABS "University Statistics Master Tables", Table 1A for each year.

disproportionate number of CPRAs. This presents a somewhat absurd paradox to the initiating principle of the CPRA scheme, 'to maintain a flow of highly trained personnel to the workforce'. It is evidence of the way the environment has changed around the CPRA scheme, causing an unintentional skewing of the awards' effects because educational and research policy are not connected within the Scheme.

Since the time of our study, the Award value has gone up by 48% (a real increase of about 30% after tax and inflation are taken into account). But the value is still low; it is regarded by the Education Department as 'student assistance' (like TEAS) rather than as a wage - though alternate income is severely restricted. It will continue to fluctuate according to political whim and affect the attraction of students into research training until these confusions are resolved.

Conservative Consequences of the Process by which Awards are Distributed

However as a demonstration of the effects of non-policy within CPRA policy, what is more important is what follows from the process by which Awards are made. At the centre of the process is the rationale - that Awards should be made only on the basis of the student's demonstrated academic excellence. No account is taken of the discipline or gender, employment prospects, research commitment, or personality of the student; no account is taken of the quality of research training the student can obtain at the institution through which the student applies for a CPRA; there is certainly no labour-force planning embodied in who gets a CPRA. All that counts is for the student to obtain Honours I in their undergraduate degree and to want to get a scholarship.

The process by which Awards are allocated serves this primary interest. The distribution of Awards occurs in two stages. The first is distribution to the various Universities by the Central Selection Committee, on the basis of their record in attracting postgraduate students, in terms of both number and quality. No account is taken of completion rates, and no attempt is made to influence the distribution of Awards according to any criteria other than those of eligibility. This produces an essentially conservative system, determined by past performance, and, in this form, with little capability of responding to rapidly changing pressures or needs.

The second stage of distribution occurs within the Universities. While a variety of administrative structures are in operation, the outcomes vary little. The preparation of a merit list rests almost exclusively on class of Honours degree, with adjustments within that ranking taking account of undergraduate record, supervisor or departmental support, and in some cases a principle of disciplinary spread. However this fine tuning has relatively little effect with regard to the distribution of CPRAs (though it may for University Awards) as the vast majority of applicants with a First Class Honours degree receive one.

At first sight, the results of our own study suggest there may be more to it. It looks like CPRAs are disproportionately distributed to science thence (some way behind), humanities candidates (rather than to those in engineering and the social sciences); to male rather than female candidates; and to young (rather than mature-age) students. These appearances emerge in comparison with the way other kinds of Award are distributed, not just in the dominance of these categories of student amongst the CPRA holders. The percentage of

Awards going to science students in 1981 was 47% of the total - compared with 21% which went to humanities students, 13% to those in the social and behavioural sciences and 5% to engineering, 'technology' and architecture students.(14) But this was because more students with Honours I had applied for CPRAs from science, thence humanities, than from the other disciplines. (15) Similarly, CPRAs favoured males rather than females; 64% were awarded to males, and 36% to females. But this distribution is identical to the balance of males to females studying full-time for research degrees without Awards. So for both discipline and gender, the appearance of a skewing in the distribution of Awards is an artefact of the prime Honours I criterion that is used in selecting candidates. There is a skewing towards the young however. This was partly for financial reasons, and partly because of the path older students often take in obtaining their undergraduate degree. With the low value of Awards prior to 1983, older students, and in particular those with dependents, often could not afford to be supported by a CPRA. The Awards are taxed, and restrictive of the number of hours that can be spent in employment, so students with financial worries were often opting for University Awards where the chance of earning extra income was easier. Older students also had usually not followed the 'normal' path directly from school to undergraduate degree to postgraduate degree favoured by most younger students (particularly in the natural sciences). The older students therefore often had unusual qualifications, or at least, were less likely to have a pure, single-discipline focused, consistent record of high performance through to an Honours I qualification. And this is what basically determined the award of a CPRA.

There is nothing intrinsically wrong with a postgraduate Award scheme which is based on student merit alone - as long as the educational goal is just 'to select the best students as measured by undergraduate performance for financial support', and is not one which includes concern for 'quality of training', nor one which includes a research policy concern about which disciplines should develop in the nation. However, it is very important to realise that the merit-alone based system does tend to foster a conservative pattern of development within the whole tertiary sector. The present distribution of Awards is most strongly determined by the prior size of the postgraduate research schools. Big schools or strongly represented disciplines attract the most students and Awards, in turn producing the highest number of PhD graduates in these fields, independently of research or teaching employment prospects in the area, and independently of any research policy the government may be seeking to apply in other quarters.

There are two other kinds of conservatism built into the scheme. The first is that research education is located singularly within, and oriented by, an education institution, guided by educational autonomy and rewards. Students tend not to look over the edge to see what is outside, nor is there any motivation within the system of Awards to do so. The students we studied most strongly desired to be employed in tertiary education institutions after graduation: 53% of the students we interviewed planned to find employment in tertiary education, and another 23% would have liked to, but having perused the employment vacancy columns didn't believe that they had much chance. More importantly, only 3% of all the CPRA students we talked with had any intention of seeking employment in industry or commerce. These are strange expectations when the students look up from the laboratory bench at the reality of employment trends. In 1981, only 33% of PhD graduates ended up in tertiary education teaching posts. The figures for industrial employment apparently concur with expectations; with the exception of engineering, where 36% of graduates were employed in the private sector, only 6% of graduates from all

other disciplines entered industry or commerce. This is radically different to the situation in most industrialised countries, e.g. in Britain 29% of PhDs enter the private sector.(17)

Thus, there is a particularly poor linkage in Australia - between university research training and the private sector. We found this to be particularly the case in the two discipline areas most strongly represented amongst CPRA holders, i.e. in the natural sciences and humanities. In our own interviews, amongst the natural science students there was no interest in industrial employment. Amongst the humanities group, students tended to be oriented away from a research career, but were very keen to obtain a teaching post in the higher education sector.(18) The CPRA scheme does nothing to breach this barrier, to encourage a stronger flow of high quality research graduates out from the hallowed walls of a monastic educational system. However the limited ability of an education policy to breach what appears to be deeply entrenched industrial attitudes and practices is readily admitted.

The other form of conservatism is accidental, but the CPRA process reinforces it. Students tend to be relatively immobile, staying within the institution where they completed their basic training. Of all the students we studied, CPRA students were the least mobile: 22% moved between Departments, but many of these students moved because they were offered a scholarship elsewhere and not at the university from which they had graduated. The small flow that did exist, was down the university status map, away from the large, traditional, institutions with established reputations, and towards the small, newer universities. In general, students simply did not know what opportunities and research areas existed elsewhere, and such knowledge (or lack of it) had almost no bearing on their application, or selection for an Award. They tended to opt for the 'devil they knew' rather than the uncertainty of another institution, and although objective evidence could not be obtained, there was plenty of hearsay opinion that supervisors tend to select students they know above students who are unknown.

STRATEGIES FOR CHANGE

In summary, our findings were that the CPRA Scheme had achieved its objectives, but that the new context provides it with new challenges. Although the CPRA scheme has a great deal to commend it in its present form, there is a need for a number of changes if it is to take account of and respond to the conflicts between educational and research objectives which create the context for postgraduate education in Australia today.

On the positive side, it is clear that the CPRA scheme has been highly successful in stimulating a substantial increase in the research training potential within Australia. In addition, of today's 'elite' research population (defined in our own research as those who had received an ARGS grant), a significant minority, just less than one third of those with Australian higher degrees, had studied under a CPRA; many stated that without this they would have moved out of research, into school-teaching or industry.

It is also clear that very good students have been supported, although as our results show, the possession of an Honours I degree is not always the best predictor of success in subsequent research. Often a better predictor of success is the possession of a high standard Masters Qualifying qualification

for this often signals the student who has taken a more unusual academic route before making a positive choice to move into research and who thus has a much higher level of commitment. (Many younger 'normal' path students didn't as much choose as 'drift' into a research career following very good undergraduate results.)

The strains we have identified cannot all be addressed through a postgraduate award scheme; many lie far beyond its influence. However, there are a number of ways in which the scheme can be adapted to take acocunt of the new context for postgraduate education and which may play a catalytic role in reuniting the education and research functions.

In order to prevent the value and number of Awards being subject to political whim rather than plan, both the financial value and number of Awards should be indexed. In addition, the mobility of students should be encouraged, by providing financial allowances and settling-in assistance, and most importantly, by generating an adequate information base for students to consult in choosing where best to pursue their research training. Mobility is important if students are to make some kind of choice about where they might obtain the 'best' research supervision. Particular care might be necessary to ensure that the promotion of mobility does not unintentionally disadvantage particular groups such as women, or mature-age students.

The more radical changes should occur on the margins, at least in the first instance. This would suggest a small-scale set of modifications designed to test the effectiveness of alternative means of student support. Our argument is that there should be diversity in the postgraduate support schemes to meet a variety of purposes.

The first alternative to be tested is one which seeks to link Awards with some assessment of the quality of training - not by a central committee of bureaucrats, but by a group of academic peers. Such a scheme could operate rather similarly to the way that ARGS grants are distributed, and would mirror many of the aspects of the British systems of research awards - distributed by the Science and Engineering Research Council (SERC), and the Natural Environment Research Council (NERC). This is not a scheme that emphasises relevance or pragmatic utility, but rather the potential quality of a student's education. As such it constitutes a more finely-tuned postgraduate education policy.

The second alternative to be tested is that of linking postgraduate education with research policy. As we have shown, when the two are in conflict, student training and careers are likely to suffer. Such an integration can only happen if there is a conscious attempt to coordinate policy at the top - i.e. through a Standing Committee which bridges the Government departments of Education and Youth Affairs, and Science and Technology. Such a committee could then have the power and overview to decide where there are particular gaps in the academic repertoire of the nation that needed filling - either for directly academic reasons or to achieve particular national goals. It could therefore direct an 'earmarked' postgraduate award scheme according to identified tertiary educational needs and policy. But as we emphasised in the Report, this approach must be seen as a 'fine-tuning' exercise, not the major way that research training is managed.

As an extension of the linking of research training with wider areas of research policy, there is also an alternative to be tested in establishing some closer links between universities and industry - to encourage (rather

than hinder) the flow of graduates into the private sector. Those concerned with science and technology research policy have presented strong arguments that such a flow, and development of private sector knowledge resources is essential to a viable and autonomous economic future for Australia.(20) We believe that a trial should be made of Awards based on the UK 'CASE' Awards scheme - where grants are given to joint industry/academic projects and supervisors, who then select suitable students. The CPRA scheme as it presently exists, mitigates against this kind of liaison in education and appears to foster an attitude amongst students that an industrial career is second rate.

Postgraduate education, responsible as it is for the preparation and shaping of the best minds in our society, is too important to be left to chance, to whims of immediate political policy, or to an approach that consciously eschews policy about quality of training, or tertiary sector and national needs. Equally, it should always be protected from the short-sighted requirement of promoting only pragmatic and 'useful' research training. Postgraduate education is the key resource in Australia's knowledge-generating and -using capacity, and in the ability of its people to see paths of action and policy clearly and critically. The primary means of government support for this essential resource in Australia has been through the CPRA scheme. This has now completed its first task, begun in the late 1950s, of getting Australia onto the knowledge-generating map. But now, in the 1980s, at a time when education and research policies have distinct objectives, a single student-merit based scheme is quite insufficient to meet Australia's evolving needs into the 21st Century. There is a need for pluralism, but a pluralism that needs to be introduced gradually, rather than through overnight radical change - i.e. through careful testing of alternative schemes, and fine-tuning of the existing system. Through adaptation of the CPRA Scheme, the longer term effect can be to shape tertiary education and national goals towards the needs of the country and its people in the changing times that lie ahead.

FOOTNOTES

(1) This article is based on a report commissioned by the Commonwealth Department of Education and Youth Affairs. The report, authored by Stephen Hill, Ron Johnston and Elizabeth Smith was entitled, An Evaluation of the Commonwealth's Postgraduate Awards Scheme , Canberra: AGPS, 1983. Two volumes were published for a wide distribution: Volume 1, "Summary Report on Findings and Recommendations"; Volume 2, "Detailed Report on Research and Findings". Two other Volumes were prepared but given limited distribution: Volume 3 "List of Tables"; and Volume 4, "An Evaluation of the Commonwealth's Postgraduate Awards Scheme" (results of an in-house study of the academic progress of Postgraduate Award recipients). The data which are referred to in the present article, are taken from Volumes 1 and 2 of the Report, which we will refer to from here on as The CPRA Evaluation Report. We would like to express our appreciation of the assistance we received in conducting the research, particularly from Ms Elizabeth Smith and also from Ms Anne Trayner.

(2) Commonwealth of Australia, Report of the Committee on Australian Universities, Government Printer, 1957 (hereafter, Murray Report).

(3) Quoted from the Consultant's Brief to the present study.

(4) Excluding postgraduate bachelor and diploma enrolments.

(5) Data for PhD candidates were only disaggregated from 1961 onwards.

(6) AVCC, Review of the Need for Postgraduate Awards, mimeo, March, 1978, para 3.1

(7) See Commonwealth of Australia, Report of the Committee on the Future of Tertiary Education in Australia, Australian Universities Commission, 1964 (hereafter, Martin Report), Recommendation 1 (ii) particularly.

(8) CPRA Evaluation Report, Vol 2, op cit, pp. 118-121

(9) See for example, Australian Science and Technology Council (ASTEC), Microelectronics AGPS, 1981; ASTEC, Robots, AGPS, 1982; ASTEC, Biotechnology AGPS, 1982.

(10) This became particularly obvious to us when our own report, An evaluation of The Commonwealth's Postgraduate Awards Scheme was released earlier this year. The collective body of University Vice-Chancellors, the AVCC strongly attacked our report, most particularly because they saw a recommendation that a proportion of awards should be centrally allocated (by academic peers, not bureaucrats) took power away from universities. In an unprecedented move, they used the authority of their position, not argument to attack the rigour of academic scholarship in the Report - done without prior consultation with us, and through the national public press, not a scholarly journal. This breaks all the rules of accepted academic discourse and debate, the very rules that academic autonomy supports. Paradoxically, the action was taken, it would seem, in the interests of preserving academic autonomy. Whether or not The Report is scholarly rigorous is irrelevant to this issue: what the AVCC's mode of response suggests is a reflection of how threatened they felt. Threatened enough to break basic academic norms.

(11) CPRA Evaluation Report, Vol 2, Stephen Hill, Ron Johnston and Elizabeth Smith, op cit, p. 9.

(12) We won't detail these texts here, but they can be found in CPRA Evaluation Report, Vol 2, ibid, pp. 35-44.

(13) ibid, pp. 11-16.

(14) ibid, p. 22.

(15) ibid, see pp. 74-75 particularly.

(16) ibid, p. 132.

(17) CPRA Evaluation Report, Vol 1, op cit, p. 15.

(18) ibid, p. 16.

(19) CPRA Evaluation Report, Vol 2, op cit, p. 169.

(20) See National Technology Strategy - Discussion Draft , Canberra: Commonwealth Department of Science and Technology, April 1984.

Examination of Research Theses

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ABSTRACT
The examination of postgraduate research theses is of vital importance to academic institutions as well as to students. This paper reviews examination procedures at one university, summarising examiners' comments on 58 theses. A number of questions regarding examiner anonymity, alternatives to the traditional doctoral dissertation, and most importantly, the criteria for the award of degrees are raised. Although great care is taken in choosing examiners, the criteria they are expected to employ are inadequate. Rates of progress of research students in different degree programs suggest that some students may well lack adequate information about the extent of their task as postgraduates.

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Late in 1982 Macquarie University received a Commonwealth Tertiary Education Commission Evaluative Study grant to conduct a review of postgraduate research supervision and coursework teaching. The author of this paper wrote the proposal for the CTEC grant, and then served as Project Director of the Evaluative Study which was conducted in the period from March 1983 to May 1984. This paper will highlight some of the information presented and issues discussed in the section of the Evaluative Study report which dealt with the examination of research theses. In this paper there are also some statements of opinion: they are identified as the author's, or sometimes as the collective opinion of the Working Party for the Evaluative Study, but they must not be regarded as official Macquarie University policy.

As part of the data collected for the Evaluative Study, 58 closed student files were studied. Each case had been finally resolved in the period 1981-1983. The following information was collected:

- the student's School or Centre of registration,
- the degree for which the thesis was submitted,
- the date of submission,
- the date of Postgraduate Studies Committee's first action, and the date(s) of any subsequent action,
- the location of examiners,
- each examiner's recommendation,
- the Committee's recommendation,
- how Part 1 compared to Part 2 in each examiner's report,
- whether each examiner requested anonymity, and
- a judgment about the extent of each examiner's comments on content of the thesis, research design and statistical analysis, writing style and presentation.

In all, the comments of 139 examiners were studied. The results of this review are reported where they are most relevant in the following discussion of issues relating to the examination of research theses.

THE EXAMINATION PROCESS AT MACQUARIE

Theses prepared by research candidates for Master's, Master's Honours, and PhD degrees are examined by two or three persons. Usually all are external to the University although the Regulations allow for one internal examiner. The examiners submit a two-part report to the University. The Postgraduate Studies Committee of Academic Senate considers all reports and recommends the award of the degree, failure, or that the student undertake further work. Further work of an extensive or substantial nature usually results in re-examination by one or more of the original examiners, or occasionally by a newly appointed examiner. Further work of a less significant type - "tidying up" of the presentation, for instance - is usually reviewed by the Head of the School in which the student is enrolled. Sometimes, but infrequently, the further work will be reviewed by the Postgraduate Studies Committee itself.

Some time ago, Postgraduate Studies Committee recommended the adoption of a two-part examiners' report form. Part 1 is for the Committee only; students never see it and supervisors may see it only in the office of the Postgraduate and Research Section of the Registrar's Office. After the Committee has reached a decision on the award of a degree (or not), students receive copies of Part 2. The main reason for adopting this reporting procedure was that there had been some cases where examiners asked that their reports remain

confidential, and then students received virtually no feedback on their work. It was believed that the two-part form would meet the needs of students as well as of examiners who wished to report in confidence to the University.

ANONYMITY OF EXAMINERS

Most academic readers will be familiar with the arguments for and against protecting examiners' identities. It is argued that students should not know who is nominated to examine their work so that there may be no suspicion of influence being exerted on examiners. It is also argued that examiners will not be willing to comment fully and freely if there is some chance that they will have to face a disgruntled student at some time in the future. On the other side, there is increasing support for the opinion that students are entitled to know how their work is assessed at all stages of their careers. Court cases have been lodged under Freedom of Information Acts in Australia as well as overseas, and it seems likely that there will be a postgraduate test case before too long (if one is not already underway). Besides the legal or quasi-legal arguments, there is the intellectual and moral issue of whether examiners should be prepared to defend their judgments publicly if students do choose to challenge them. Some students and academics argue that students are already at a substantial disadvantage in being "at the bottom of the pecking order" and that it is unjust that they may have to argue with a shadowy authority. At Macquarie University, the question of whether examiners should be guaranteed anonymity is linked to the use of the two-part form, which was originally devised to meet the students' need for advice and comment on their work and, at the same time, some examiners' desire to report in confidence to the Committee.

It is common practice for supervisors to consult with students in drawing up a list of potential examiners. Students are usually asked for their suggestions and preferences. While students do not have an absolute power to veto a particular nomination, it would be an extraordinary situation for a supervisor or Head of School to choose an examiner against whom the student had an objection. Thus, although students are not to be told which of the potential examiners are actually nominated, they usually have a pretty good idea who is to examine their thesis.

When examiners receive theses, the University advises them that they "may opt for their name to remain confidential by not recording it in Part 2" of the report (the portion which is sent to the candidate). This option is exercised very rarely. Of the 139 examiners whose reports were studied, only 9 chose to remain anonymous, and 10 more seemed to ignore the question by not filling in their name on the appropriate line but then legibly signing Part 2 of the report. Thus, it seems that few examiners are concerned about protecting their anonymity.

Lovas (1980) suggests that not only should examiners be made known to the candidate but also that they, the candidate and the supervisor should be encouraged to communicate with each other for the clarification of any details before a decision on the thesis is reached. Macquarie University sends to examiners of PhD theses an information sheet which advises that they may consult one another and even prepare a conjoint report. They are also told that they

> may require the candidate to undergo written, oral or practical exami-

> nations ... Proposals for extra examination ... may be submitted to a candidate through the Registrar.

Neither of these options is exercised more than rarely.

Another suggestion, made by Montgomery (1980), is that a student's research proposal should be vetted by potential examiners to reduce the possibility that a thesis may be rejected for inadequate objectives. Again anonymity could be sacrificed, but for an important advantage to the student. Such a suggestion may seem difficult to implement, but it is worthwhile considering possibilities outside the usual practice.

Finally, students often express worry over what may be in Part 1 of the report which is available only to the Postgraduate Studies Committee. Committee members tend to try to reassure them that Part 1 is usually almost exactly the same as Part 2 or is a brief summary of Part 2. In conducting a review of student files, the author attempted to compare the tone and content of the two parts of each examiner's report to see if any arguments for the retention or the abandonment of the procedure emerged. It was possible to categorise 131 of the reports on a simple qualitative basis. In half of these cases Parts 1 and 2 were either identical or Part 1 formed a section of Part 2. So the first conclusion is that half of the sample seemed not to use the option of reserving some information from the student. Of the 64 cases where something different was said in the two parts, there was no major difference in the tone of the two parts in 30 cases. In these 30 reports Part 1 was different from Part 2 but neither more nor less encouraging or critical; usually the biggest difference was in the detail provided to the student about errata in the text. However, 34 examiners offered Parts 1 and 2 that differed in tone considerably, and in 26 of these cases it was Part 1 that sounded more positive, less critical, and/or less "nit-picky". Only eight of the examiners seemed to be trying to spare the student by saying something more damning to the Committee than to the student. In addition, there were eight cases where Part 1 would have made Part 2 much more comprehensible or useful to the student.

Some individual cases illustrate arguments for and against the two-part report. In the first, a student was asked to undertake additional work on a Master's thesis to the satisfaction of the Head of School. Such a decision by Postgraduate Studies Committee usually suggests only minor revisions, but the student decided it was not worth the effort since there was no guarantee the revised work would be accepted. This was a case where one of the examiners produced a very negative Part 2 as compared with Part 1; Part 2 went into detail about everything that was wrong but did not contain any of the statements about why the work was still worthwhile that were in Part 1. Possibly with a few words of encouragement, that student would have done the minor revisions necessary, and two years' work would not have been wasted.

In other cases, a different situation has arisen because the tone and content of Part 2 differ from Part 1. Where examiners have been kind to students and relatively harsh in their comments to the Committee, students have found demands for revision almost incomprehensible. In another case, we see a situation where an examiner offered some very strong criticisms of the supervision a student had received in Part 1 but deleted most of these comments from Part 2. Certainly, a difficult situation may have been averted by the student not having access to Part 1. On the other hand, should students not know when examiners question the judgment of supervisors?

The balance of the argument, in the opinion of this writer, seems to be in favour of abandoning the (somewhat unusual) two-part report form used at

Macquarie University. I would even argue against guaranteeing examiners' anonymity. The rest of the Working Party was not prepared to recommend this change, however. While they thought that the emphasis might be changed by revising the report form so that there was essentially one part and an invitation to the examiner to address the Postgraduate Studies Committee directly and in confidence, they believed that there were significant advantages in providing an avenue for confidential communications.

REDUCING THE FREQUENCY OF RESUBMISSION

The Working Party heard a number of statements that there are too many students being asked to resubmit theses. One opinion is that if the thesis is unacceptable, it should be failed outright, that anything less suggests low standards. Another opinion is that rather than require rather mechanical revisions which do not substantially change the nature of the research, Postgraduate Studies Committee should recommend the award of a lesser degree. Yet another group of academic staff argue that if students were required to undergo an oral examination, many minor differences of opinion between examiners and misunderstandings of students' work would be avoided, and there would be fewer students directed to revise their work.

Postgraduate Studies Committee has taken several steps over the past few years to reduce the number of revisions. Some time ago many revisions seemed fairly trivial matters related to the format of the thesis or referencing or even proofreading; the Committee sought to reduce these by having supervisors sign a form at submission which states that they have seen the completed work and it is in the required form. The Committee has also set up a subcommittee of three to review examiners' reports before the meeting of the full Committee. This practice has resulted in more complete and substantive discussion of disagreements between examiners and the presentation to the full Committee of more complete files than formerly, as extra information may be sought before the meeting. In addition, the Committee has introduced new options such as revision to the satisfaction of the Committee itself and oral examination. All of these steps appear to have been effective in reducing the number of revisions and ensuring a fair and complete review of each case.

The review of 58 student files counted 36 cases where students passed on the first submission and three where there was a clear failure; one student was allowed to revise his work and resubmit it for examination for a lesser degree (successfully). Of the others, 17 resubmitted their work for the original degree and passed; one chose not to resubmit. There were 18 cases in which the examiners' recommendations differed, and the Committee had to balance the comments to reach a decision. Usually in such cases students are required to undertake some revisions, even if there have been two favourable reports and one which expresses reservations. Overall, those students who reach the stage of submitting a thesis are very likely to be successful at the level attempted, though they may have to undertake some revision. Some members of the academic community have interpreted this as meaning that persistence alone is enough to earn a higher degree. The Working Party did not share this opinion.

While the Working Party was most concerned to see that Macquarie maintain high standards of postgraduate research, it was also concerned about students who already face many obstacles in their candidacy. We found no evidence of declining or low standards and agreed that the University must rely on super-

visors, examiners and the Postgraduate Committee to judge students' work rigorously but fairly. The Working Party did not wish to recommend more frequent award of lesser degrees rather than requiring students to revise work for resubmission. The process of rewriting can in itself be instructive and beneficial to students who will have to undertake similar tasks in the future with less guidance than they have as students.

The Working Party favoured the more frequent use of oral examinations, particularly in cases where examiners differ in their recommendations but none reports that the thesis is a total failure. Improved and less expensive telecommunications may reduce both the costs and the inconvenience of such examinations.

ALTERNATIVE TO THE DOCTORAL DISSERTATION

In meetings with Schools, particularly science Schools, the Working Party was asked to consider the possibility that a PhD could be awarded to a candidate who presented a set of published papers as evidence of sustained research effort in an area of study. Even within those Schools where the suggestion met with some approval, there was recognition of potential difficulties for students who choose this path. One of the first is obviously the difficulty in some subject areas of getting any work published because financial constraints have so reduced avenues for publication. Another is the reluctance of some editors to accept innovative or unusual work from unknown authors. Another is the large time lag between acceptance for publication and the actual appearance of the work.

Reid (1978) and Spriesterbach and Henry (1978) present some of the most convincing arguments in favour of accepting journal articles or journal-style presentations in lieu of the traditional thesis.

Whether students are destined for academic, research, government or industrial careers, professional advancement commonly will depend on an ability to write journal-style articles or internal reports. The necessary skills for such writing are not developed in writing expansive dissertations. Partly because the standards of style of thesis-writing in various disciplines are vague, there seems to be a tendency for students to produce longer and longer theses in some sort of misguided academic 'one-up-personship'. ("If X's thesis which was the last successful one in my School was 400 pages long, mine had better be 450.") On the other hand, standards of style for publication are much more specific and well-known by those academics who supervise postgraduates. Students need to learn to select those data and/or arguments that are genuinely important, significant and worthy of communication to the rest of their scholarly community. Their supervisors should be even better prepared to advise them on these matters than on the preparation of extended theses.

Another argument in favour of journal-style theses is provided by the review of examiners' reports conducted for this Evaluative Study. Examiners' comments most commonly concentrate on the content of the thesis, as opposed to the research methodology, style or presentation. They often ask for a clear philosophical stance or for a student to draw a conclusion. Faults most often noted are: unnecessary length, repetitiousness, lack of coherence, and confusion related to an unclear hypothesis or a failure to reach a conclusion. Most of these faults would be much less likely if students were writing in the

style of journal presentations.

Not only does writing a traditional dissertation become a heavy burden on students, the very length of the presentation may act against the usefulness of the research. Far from being a significant contribution to knowledge, the frequently excellent work presented in dissertations all too often lies collecting dust in university libraries. There are enough analyses of citation indexes, orders placed for copies of theses listed in Dissertation Abstracts International, etc., to convince us that the dissertation has never established itself as a useful tool for the communication of knowledge. Few academics can remain unaware of the increased difficulty of having monographs published as traditional publishers of academic work become more and more cost-conscious and less interested in work with a limited audience. We are not aware of an Australian study which documents the number of publications resulting directly from research conducted during PhD candidacy. (It is possible that some data is contained in a recent Council of Australian Postgraduate Associations report on the role of postgraduates in Australian research, which was not yet available at the time of writing.) American reports suggest an alarming failure of university and college academics there to follow up their postgraduate study with significant publications. Whether this is the case here or not, indications are that knowledge might be better advanced by less extended presentations of postgraduate research.

The traditional dissertation need not be abandoned altogether, but there are good reasons for allowing alternative styles of presentation. Reid reports that one of the most serious objections to the journal-style dissertation is its lack of a substantial literature review, which forms an important part of most theses and demonstrates a student's ability to analyse critically and synthesise the work of scholars in his/her field as well as the basic bibliographic skills needed by any competent researcher. He suggests that this problem may be overcome by requiring students to include the literature review which must precede work in any area as a separate section of the final submission. The Working Party at Macquarie believed that students would benefit if a written project proposal were required at some fairly early stage of a candidacy. Such a proposal should include a literature review which could later be submitted with the journal-style report(s) of the project itself. (The process of preparing a formal research proposal should itself prove useful to many students in their careers.) Reid also suggests a second compromise to the traditional dissertation in the inclusion of extensive tabular data in an appendix.

Reid's recommendations do not require that the article(s) be in print or even accepted for publication at the time of submission.

> The dissertation may include reprints of papers already published or unpublished manuscripts. Either may include names of coauthors, the usual acknowledgements, and bibliography in the specific style of the selected journal.
>
> If the paper has been accepted for publication at the time of the dissertation defense, the examining committee may consider this accomplishment in judging the candidate's scholarly contribution. If the paper has yet to be submitted to a journal, the committee may help the candidate judge whether or not the work constitutes an original contribution to the field. Functioning in this manner the committee becomes an informal review board, which may help the candidate produce an acceptable paper. The candidate develops an understanding of the value of suggestions for improvement as a realistic part of the scholarly pro-

cess. With the conventional dissertation, suggested modifications may be interpreted as artificial standards contrived at the whim of the advisory committee rather than an honest attempt to improve the product.

A number of questions would have to be resolved if the journal-style alternative were to be allowed. For example, Reid's report of acceptable practice at the University of Georgia states that joint research may be presented for examination by a candidate. There would have to be some definition of expectation of the extent of the student's role in such research and perhaps a specification that at least one paper be prepared by the student alone. Research performed by a student as a member of a team is already being presented in theses, and it should be no more difficult to deal with the situation if the format of the thesis is different; it may even be easier in that joint authorship is understood and acceptable in publications.

One group of students in particular should benefit from this alternative. Staff members who are enrolled as part-time PhD candidates are under heavy pressure to publish, as well as to produce the traditional dissertation, as well as to teach heavy tutorial loads, and sometimes to lecture. Many of them do have work in print before the submission of a thesis, and many of them do have trouble completing the writing-up even though the research has been concluded. If their published work or manuscripts could be presented along with a literature review and an appendix (if necessary) they might find part-time candidacy and full-time employment more manageable. (I believe that staff at the Australian National University are allowed to make such presentations.)

CRITERIA FOR THE AWARD OF DEGREES

There are in the literature a number of discussions of the inadequacy of the criteria for the award of postgraduate research degrees and challenges to the traditional criteria of originality, independence of thought, and significance. (See for example, Bottomley, 1973; Montgomery, 1980.) At Macquarie University there are three levels of research degree: Master's, Honours Master's and PhD. It seems that there are some problems in clarifying how these degrees differ from each other and what demands ought to be made on students working at the different levels. In fact, the clearest distinctions between the degrees are made on the basis of admissions requirements and periods of candidature, and they are not without anomalies.

In brief, the Master's degree regulations and the PhD regulations state that to qualify for admission to a pass Master's degree, applicants are expected to have a Bachelor's degree; for an Honours Master's program, they should have an honours degree of Bachelor with Honours Class I or II; PhD applicants should have an honours degree of Master, but others with lesser qualifications - down to Class II Bachelor's Honours - may be considered on the recommendation of the Head of School or Director of Centre. There are also regulations which provide for the admission of other students for whom special cases may be made.

The Regulations specify periods of candidature as follows:

Pass Master (by thesis):
If candidate holds Bachelor's degree:
Minimum: full-time - 2 years Maximum: full-time - 4 years
part-time - 3 years part-time - 6 years
If candidate holds Bachelor's degree with Honours:
Minimum: full-time - 1 year Maximum: full-time - 2 years
part-time - 2 years part-time - 4 years

Honours Master:
Minimum: full-time - 1 year Maximum: full-time - 2 years
part-time - 2 years part-time - 4 years

Doctor of Philosophy:
If candidate holds a Master's degree:
Minimum: full-time - 2 years Maximum: full-time - 5 years
part-time - 3 years part-time - 6 years
If candidate holds Bachelor's degree with at least Class II Honours:
Minimum: full-time - 3 years Maximum: full-time - 5 years
part-time - 3 years part-time - 6 years

These Regulations clearly try to achieve some balance between the amount of preparation research students bring to their candidacy and the amount of work expected for the different degrees. However, there are many potential situations where requirements overlap. One example is that a student with a lower Second Class Honours Bachelor's degree could enrol as a part-time candidate for either a pass Master's degree, taking 2-4 years, or an Honours Master's degree, taking 2-4 years, or a PhD, taking 3-6 years. Many other permutations are possible. The point is that without some further description of what constitutes the type of work expected of students at the different levels, it is quite possible for students and examiners alike to feel somewhat at a loss as to whether a particular project or thesis is substantial or original enough, or more so than it need be. Data on student rates of progress collected for the Evaluative Study showed that part-time Honours Master's students are taking nearly as long to complete their work as part-time PhD students. In a similar vein, the average duration of part-time study in Pass and Honours categories differs by only half a year (and exceeds that of full-time PhD candidates) (Nightingale, 1984). In the opinion of this writer, these data suggest that at least some students are confused about the extent of their task as postgraduates.

Students also occasionally comment to this effect. Massingham (1984) points out a number of deficiencies in the thesis-only research degree programs typical of Australian universities. His most telling point concerns the uncertainty of the system. He continues:

> It is almost impossible to get any clear information on what a thesis is or should be. Marvellously ambiguous phrases, like "a contribution to knowledge", are bandied around by the authorities. But, what students who are embarking on their first really major pieces of solo work need are some clear guidelines. And these they do not get.
>
> At UNSW, the conditions for the award of degrees in the Graduate Study section of the calendar give more precise information on the size of paper to be used and the margins to be left on each side of the sheet than on the university's understanding of what a thesis is.

Massingham acknowledges that a supervisor should be able to offer useful advice, but then chronicles some of the situations that lead to difficulties

in supervision and make such guidance on standards less than certain.

At Macquarie, the only statements in the PhD regulations that relate to criteria for assessment are that the thesis must "reach a satisfactory standard of literary presentation", that its length must conform to the requirements of the Head of School or Director of Centre, and that it must be the student's own account of the work. Master's degree regulations specify only that the length of the thesis conform to the requirements of Head or Director and that sources of information must be acknowledged. One is tempted to ask questions bordering on the ludicrous: Can a PhD student write his/her own account of someone else's work, without acknowledging sources of information? I do not mean to be flippant, nor do I believe that Macquarie is alone among universities in offering incomplete guidance about the criteria for assessment of research degrees. Even advice about requirements of length is incomplete and fails to differentiate between the levels of the three research degrees. On page 308 of the Calendar students are advised that:

> The Heads of all Schools have prescribed that a thesis should be written as concisely as possible.
>
> Additional requirements regarding length have been prescribed by the Heads of Schools listed below:
> Schools of Behavioural Sciences, Biological Sciences and Earth Sciences.
>
> Theses on scientific subjects should not exceed 50,000 words. Theses on other subjects should not exceed 100,000 words.
>
> Schools of Chemistry and Mathematics and Physics theses should not exceed 50,000 words not including diagrams and appendices.
>
> School of History, Philosophy and Politics theses should not exceed 100,000 words (PhD), 80,000 words (MA(Hons)), or 50,000 words (MA).

Thus, History, Philosophy and Politics is the only School to have attempted to distinguish quantitative differences between the degrees. In fact, the Philosophy discipline specifies a fairly elaborate formula which balances the amount of coursework and the size of the thesis or research project required of candidates for each of the three degrees (see Macquarie University Calendar 1984 pp. 382-3). Total workload for a Master's degree should be between 24,000 words and 35,000 words; for an Honours Master's between 40,000 and 60,000 words; and for a PhD between 69,000 and 88,000 words.

The only other attempts to distinguish between the criteria for the degrees that the Evaluative Study located were as follows:

The School Counselling Master's program (a coursework program which requires a research project) will allow suitably qualified students to do a "more extensive and challenging research thesis than usual" in order to qualify for an Honours degree of Master. (p. 377) Similarly the Master's program in Counselling states, "An honours program involving a more exacting and research-oriented project is also offered". (p. 310)

The Mathematics discipline of the School of Mathematics and Physics distinguishes between the requirements of Honours Master's study and PhD study by adding the word "substantial" to the phrase "original research under the guidance of a supervisor", (p. 367) In addition, Master's Honours students must pass two courses and be able to read mathematics in either French, German or Russian, while PhD students must pass four courses and fulfil the

language requirement.

Another document which offers an additional statement of the criteria for award of research degrees is the sheet mailed to examiners of PhD theses. It states:

> 1. The PhD degree is normally awarded solely on the result of the examination of the thesis. The thesis - to which may be added other supporting writing - represents the culmination and achievement of the candidate's study and research.
>
> 2. The thesis must form a distinct contribution to the knowledge of the subject and afford evidence of originality shown either by the discovery of new facts or by the exercise of independent critical power.

Finally, the form filled in by examiners of PhD theses implies an elaboration of the criteria above. It contains the statement:

> I report that in my opinion:
> (a) The thesis forms a distinct contribution to the knowledge of the subject concerned and affords evidence of originality shown by
> (i) the discovery of new facts,
> and/or
> (ii) the exercise of independent critical power.
> (b) the literary presentation of the thesis is satisfactory
> (c) the thesis contains material (in the whole or in part) suitable for publication subject to ... (examiners complete the statement).

The Working Party noted that there is no instruction to examiners about how to deal with this statement. Are they to delete sections which are not applicable? Would any deletion mean a student fails? There is no similar statement on the report form filled in by examiners of Master's or Honours Master's degrees. One form is used for either degree. Examiners are instructed that they may recommend the award of a pass degree rather than an Honours degree. However, there is no advice sheet for examiners of Master's theses (pass or Honours) and no information offered in the Regulations (which are sent to examiners) about what the expected standards of work are. Staff in the Postgraduate and Research Section of the Registrar's Office report that examiners frequently ask what the difference between pass and Honours Master's work is supposed to be, and that they are not able to offer a good answer.

The Evaluative Study also called attention to the fact that very few students, PhD or Master's, ever see the documents that are mailed to examiners and so have even less information about the formal criteria by which they are to be assessed. Presumably their supervisors are expected to advise them, but given the paucity of information in University documents, supervisors can hardly be expected to offer much more than the old chestnuts about a significant contribution to knowledge and originality, which often seem to alarm students more than to inform them. Most students take their cue from the theses that have succeeded in their discipline, but we fear that at least in some cases these models tend to perpetuate certain excessive demands students place on themselves, and which supervisors, who usually see theses piecemeal, may not combat.

According to the evidence offered by Bottomley and Montgomery on practice in other Australian universities, and by others on overseas specifications of

criteria, other institutions are not providing much more specific advice to students or examiners than Macquarie. At Monash, Bottomley reports, the Master of Science regulations specify that:

> The candidate shall submit a thesis embodying the results of an investigation carried out by him [sic], under supervision, showing independence of thought and demonstrating the candidate's ability to carry out research in the field concerned.

In contrast, the PhD regulations state:

> Subject to and in accordance with these regulations, the degree of Doctor of Philosophy shall be awarded for a thesis, which in the opinion of the examiners is a significant contribution to the knowledge or understanding of any field of study, with which a faculty in the University is directly concerned and which demonstrates the capacity of the candidate to carry out independent research.

The advice provided to examiners of University of Queensland PhD theses specifies the following standard of examination:

> The University of Queensland requires its theses to be assessed at the standard of the major universities of Europe and North America. The candidate's thesis should provide a substantial contribution to learning and should reveal a capacity to relate the research topic to a broader framework of knowledge in the disciplinary area in which it falls. Examiners' comments on the candidate's originality and critical insight would be particularly valuable. The thesis must be clearly, accurately and cogently written and suitably illustrated and documented.

In addition, in some Faculties at Queensland, the Rules for Master's degrees by research quoted in the Higher Degree Handbook state that the basis for award is that

> A candidate shall furnish evidence either - (a) of scholarship and some independence of thought; or (b) of having made a contribution to knowledge. The evidence furnished will be a thesis ...

This writer believes that criteria such as these are insufficient basis on which to evaluate the work of several years and on which to distinguish between levels of achievement that may possibly determine the course of a whole career. While I believe very specific criteria to be inappropriate to describe work done in vastly differing subject areas, some descriptive criteria have been provided for the assessment of project work in coursework Master's programs and for the assessment of levels of Bachelor's degree honours classes. The Macquarie Working Party considered examples from Macquarie's School of Education, the pharmacology department of the University of Western Australia, and from a report on a seminar on assessment of theses held at the University of Auckland. There is not space here to reproduce full documents, but these sources include statements such as:

> The criteria on which the projects will be evaluated are:
> 1) The clarity with which the topic and its related activity are outlined; ...
> 4) The comprehension of, and skill in, interpreting the appropriate underlying theoretical position ... (School of Education documents, Macquarie University, 1982).

Or, another example:

> A student should aim to achieve the following when he [sic] has completed the honours course in pharmacology:
> a. Comprehend the designated area of research so as to design suitable experiments to investigate the chosen problem ...
> e. Develop the ability to communicate his scientific findings. This applies to written communication in the form of a thesis and oral and visual presentation as in a seminar; ... (quoted by Anderson, 1984).

Admittedly such examples are unusual and do not represent a consensus of academic opinion. It may well be impossible to obtain consensus. Jones (1981) writes in his seminar report,

> To actually get agreement on these criteria, or priorities, would be difficult for two reasons.
> 1. The available data suggests that thesis markers differ considerably in their perceptions of what is important in a thesis.
> 2. Different topics and methodologies are likely to demand different assessment criteria ...
> But having said this, there is a need for discussion among staff so that they can make more explicit to their colleagues, their students - and themselves - the frameworks within which they judge a thesis.

At the least I believe it is necessary to clarify the criteria by which research degrees are assessed so that examiners may receive: an adequate description of the range of degrees awarded by the institution, and an adequate description of how they differ from each other and what the specific requirements of the different degree programs are. In addition, examiners should receive a description of the examination processes of the institution and a clear statement of the options examiners have in conducting their evaluation of the thesis and in recommending action by the university. Of course, all of this information should be placed in students' hands at the beginning of their candidacy. How this clarification is to be achieved I am not at all sure. One can imagine endless Committee meetings at which are argued fine points of wording without really addressing the issues, such as just what are the international standards of the finest European and North American universities and who is in a position to judge them? Or possibly some researcher will design an interview schedule or a questionnaire to collect academic staff opinion in an effort to derive descriptions, but one fears that few staff will be able to offer much of an advance on "a substantial and original contribution to knowledge" as the description of PhD theses and a slightly watered-down version for Master's degrees. Despite the problems, however, it is important that universities move past the sort of assessment that is based on the criterion: "I know one when I see one".

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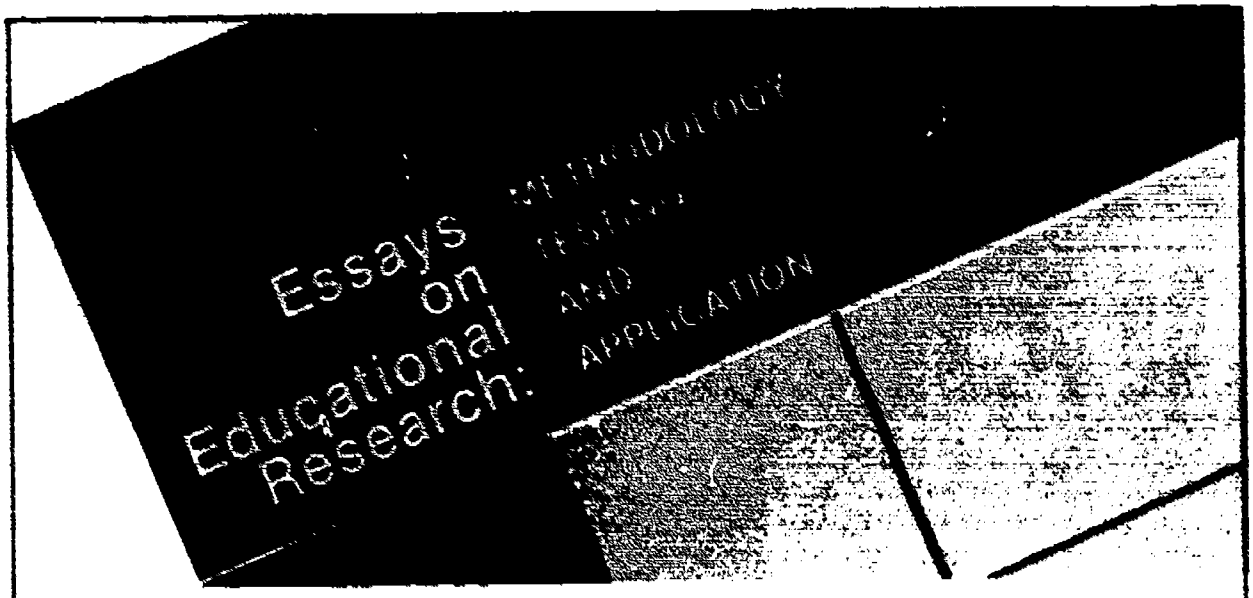

"The exciting aspect of the articles in this volume is their common thrust in rejecting an outmoded view of research and its uses. Research is now located in society and is inevitably a product of society. It is not a set of activities that takes place at some Archimedean point above society; no one can be a glacially distant observer who studies society while keeping it at bay. Research is part of society, affected by it, and mostly influencing it in indirect ways."

—Thomas D. Cook, from the preface

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Supervision of Higher Degree Students —Problem Areas and Possible Solutions

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ABSTRACT
Supervision of postgraduate students remains an area of concern to university administration, to supervisors, to student unions and the individual research student. Many studies have examined student dissatisfaction with supervision. However, there is also considerable uneasiness among academic staff about the extent of their supervisory role and functions. In a series of workshops in several tertiary institutions problem areas were discussed with supervisors, both experienced and inexperienced; and practices and strategies were explored which facilitate effective supervision. Those provisions for and approaches to supervision which supervisors have found to be effective are presented and discussed as they apply at the institutional, departmental or individual level.

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INTRODUCTION

Whenever new fields of study or changes in the degree structure are introduced into the education system, problems surface which need solutions to ensure further satisfactory growth. But they also usually raise questions which challenge the accepted conventional methods and approaches in education.

Higher degree studies are one such area where growth has been spectacular over the past 35 years. Indeed, PhD studies in Australia are younger than many of the persons undertaking them. Only in 1948 was the first PhD awarded at an Australian university. Previously students had, and for some ten years after that they still tended, to go abroad to gain a PhD (Hill et al. 1974, p. 15). Thirty-five years later there were over 23,000 higher degree students enrolled in the 19 Australian universities, representing 14 per cent of total student enrolment in this sector. A third of these higher degree students were enrolled full-time, two-thirds had part-time or external status (University of Queensland 1983, p. 234). As higher degree studies are pursued predominantly by research, a considerable number of staff and students are involved.

During the expansionary period reports emphasised the quantity of higher degree students, but in the seventies the focus shifted to concern with the quality of higher degree studies, and the conditions which help and hinder postgraduate research study. Studies by the Australian Academy of Science, the Australian Vice-Chancellors' Committee, the Federation of Australian University Staff Associations addressed problem areas in postgraduate study and there were spirited debates in various journals about the supervision process and supervisors' use and misuse of power. Several universities held conferences or seminars on supervision and various postgraduate student associations, academic development units and researchers conducted surveys of aspects of supervision (Moses, 1982a).

Society's need for well trained graduates with higher degrees has been established in various reports, beginning with the Murray Report in 1957. Over twenty years later the Australian Vice-Chancellors' Committee (1978) summarised the societal and institutional need for research workers and research students:

> The university sector of tertiary education has the responsibility for carrying out the most advanced educational functions and, to do this, it needs to be deeply involved in research. ... The universities are also training the research workers of the future and those who will apply research results and methods in industry, government service, and society at large. The quality of the university research effort is therefore of the greatest importance to the nation as a whole; and higher degree graduates are a national resource whose quality and number materially affect the welfare of the nation. (2.2)

It is, then, higher degree students who eventually will affect the welfare of the nation. How do they get to this stage, and what stops them?

If postgraduate students are a national resource, care ought to be taken to ensure that they have the best possible chance of fulfilling their potential, of acquiring their higher degree. But many students withdraw and many take well beyond the expected time. At the University of Queensland in 1982, 172 students withdrew their enrolment for a higher degree within the first five weeks of semester, while 616 students stayed enrolled (University of

Queensland, 1983). This is a high proportion of those who took steps to gain higher degrees. The costs of withdrawal are comparatively small to students, the institution and society at this early stage, disregarding the cost of unrealized potential. But for students who drop out after several years of research the investment in time, money and personal commitment is considerable. Similarly, the costs to the supervisor and the institution are the greater the longer the student persists before dropping out, leaving an unfinished project. A recent study of the progress of Commonwealth postgraduate award holders who commenced their higher degree studies between 1974-76 showed that by 1981-82 32 per cent of PhD award students were still continuing their studies or awaiting the results of the examiners and 17 per cent had dropped out; of research masters students 37 per cent had withdrawn (Department of Education 1983, pp. 16, 19). A study at the University of Western Australia established that part-time postgraduates tended to withdraw for non-university related reasons, while full-time postgraduates withdrew less frequently but were more likely to do so for reasons associated with study (Anderson and Johnston 1983).

From the literature, various factors which contribute to the dissatisfaction with the system of higher degree studies emerge. These include:

1. Lack of adequate research funds for staff. More funds would make it possible to establish more viable research projects, purchase equipment and involve more postgraduate students in projects.

2. Inadequate support for postgraduate students through scholarships, grants and facilities.

3. The structure of higher degrees by research alone, without coursework components.

4. The system of examining (largely external).

5. Supervision.

This paper concentrates mainly on supervision of higher degree students, looking first at the problems students report, and then at the problems staff encounter, followed by suggestions for tackling some of these problems.

THE STUDENTS' SIDE

A number of studies in Australia, New Zealand and notably Britain (these countries having similar systems of higher education) have shown that a consistent proportion of higher degree students are dissatisfied with the supervision they have received (University of Queensland Union 1983, Barrett et al. 1983, Battersby and Battersby 1980, Rudd 1975, Welsh 1978). Several sources of discontent have been established. These may be called:

1. Personality factors: Neglect by supervisor; clash of personalities; barriers to communication arising from age differences, cultural or language differences; personal differences in work approach.

2. Professional factors: Misinformed or ignorant supervisor, leading the student on the wrong track; supervisor with few genuine research interests, or research interests which are different from those of the student.

3. Organisational factors: Supervisor having too many students to supervise; being too busy with administration; unable to manage his/her research group properly; departmental arrangements and facilities isolating the student; inadequate support services and provision of equipment.

Student comments in a recent survey of higher degree students (University of Queensland Union, 1983) illustrate these factors:

1. Personality factors

> My supervisor did not like me from the very first day we met. I have had to continually endure a barrage of petty jokes and innuendo that were not very flattering. I have had to continually bend, because, let's face it, I need him, but he doesn't need me.
>
> Supervisor too strict on the area of my research. I would like to expand and try other (but related) areas but the signs are that he wouldn't be happy with that.
>
> My primary supervisor has very strong ideas, and it is difficult to argue with him. Having two supervisors now helps.
>
> Sometimes have difficulty in communicating my opinion to supervisor - or at least his taking note of them. He can have an unrealistic view of the time and amount of work in some projects.

2. Professional factors

> Basically my main supervisor's lack of experience in the area of research that he encouraged me to pursue has led to some crummy ideas and a lot of wasted time trying to work out what I am doing.
>
> He [the supervisor] cannot make any worthwhile comments about the formal presentation of the thesis and additional sources of material, and when he decides to quickly peruse my work does so in a sloppy manner - contradictory comments, "red herrings", and vague and meaningless comment.
>
> It is very time consuming and disheartening to recognise that a communication problem exists because there is not really a ground of common knowledge on which to initiate critical discussions.

3. Organisational factors

> Supervisor exhibits no control over postgraduates who refuse to co-operate with the rest of the group. There are five postgraduates in our group and I feel some control is essential for harmony. His lack of control has caused us to waste much time arguing.
>
> Length of time to have the submitted parts of the thesis read by supervisor if this coincides with busy part of the semester.
>
> My main supervisor has been far too ambitious for his own promotion, and not considerate enough of the time required of his postgraduate students to complete proposed projects. This lack of consideration includes changing and adding to current projects, which not only results in a longer period required to finish, but also a reduction in the quality of the final product, due to the greater workload that this creates, while

> still trying to complete previous work. Postgraduate students should have definite rights as to the exact nature of their project, based on their initial proposal. Supervising academics should be limited in the number of postgraduates that they can supervise at any one time and should be subject to more stringent control from the head of department and the dean.

The survey found, like other studies, that between 20 and 30 per cent of students were not satisfied with supervision. For 10 per cent of students, supervisors had not met their expectations, and another 19 per cent said that their expectations had only partly been met.

A recent study at the University of New South Wales established that nearly half of the PhD and master students were dissatisfied with research equipment and facilities, and nearly as many were dissatisfied with technical assistance from support staff. Literature and search facilities affect students in non-technological and non-equipment based departments; a quarter of those PhD and master students were dissatisfied with those facilities. The results are consistent with other findings in the literature. Factors which cause dissatisfaction seem to be common across similar systems, across supervisors and across students (Barrett et al. 1983).

THE SUPERVISORS

Most university teachers are appointed primarily on their research records, and where appropriate, on professional expertise and experience. They are rarely asked to show proof of their teaching ability and supervision skills. Except in departments of education there is no conviction that teaching skills could profitably be acquired formally. The demands on the tertiary teachers vary greatly depending on the levels they are teaching. Teaching large first year introductory courses requires different skills from leading honours seminars, supervising a research student, or directing a research team with postgraduate students. When discussing the place of research and graduate training in universities the AVCC (1978) pointed out that

> ... the more advanced the level of teaching, the greater the linkage between the quality of teaching and the practice of research. Teaching at honours level requires the involvement of research-oriented instructors while, at the post-graduate level, the research and graduate education roles of the university are inextricably linked. (p. 2)

This link is well expressed in the Burnett Report (1977) on research and graduate study:

> The supervisor of a research degree plays a crucial role both in the selection and execution of a research project, and in the personal training and development of the student. It is probably the most responsible task undertaken by an academic. (p. 17)

And the Federation of Australian University Staff Associations (FAUSA) stated (1979):

> The supervisor-research student 'apprenticeship' represents the most important channel of intellectual inheritance between one generation and the next. (p. 21)

Given the universal acclaim for the supervisor's role it is surprising that little is done to help supervisors in this function. Many universities have academic development units, however small, but most of their energies seem to be directed towards the improvement of undergraduate teaching and learning. Most universities have some guidelines for supervisors, however general, but they are of little help with many aspects of supervision. Many schools and departments have some conventions and practices, however inarticulated, which evolved to foster better postgraduate studies, but for many staff and students they are ineffectual and do not address the issues directly.

Prompted by consistent complaints by graduate students about inadequate supervision and by the University's interest in the issue of supervision I developed a three-to-four hour workshop on supervision of postgraduate students. This has been held in various forms six times at the University of Queensland and seven times at other institutions around the country, involving about 170 supervisors. The workshops were advertised as aiming (1) to increase staff awareness of their assumptions, expectations and approaches with regard to supervision; (2) to enhance their understanding of role conflict for supervisor and students at postgraduate level; and (3) to enable supervisors to clarify their approach to supervision vis à vis student and institutional expectations.

In the workshops participants were asked to note down three aspects of supervision they expected to discuss in the workshop and to state the one aspect of supervision they felt most uneasy about. Summaries of earlier workshop discussions were disseminated among participants (Moses 1981, Moses 1982b). By reporting staff concerns here I am assuming, of course, that these were the issues which prompted staff to come to the workshops. In most universities it seemed that departmental discussion of these issues is either non-existent or needs to be more extensive. The points, then, mentioned below might well serve as topics for departmental, faculty or school-wide discussion.

A few participants wanted generally to define the supervisor's role. Most wanted to discuss specific aspects of the supervision process, the extent and manifestations of the supervisory responsibility, and professional and personal relationships with students. The following groups of topics were mentioned, in descending order of frequency:

1. Amount of supervision or direction, e.g. extent of help given to students considering that students should be doing a piece of original research; amount of input into the drafting, writing, correcting of the thesis; balance of responsibility between supervisor and student; amount of independence of action students need or can be allowed.

2. Selection of topic or research project, e.g. financial limitations affecting project choice; financial support and resources available; place of topic in the departmental research programme; conceptual framework of topic; relation between supervisor's current field of research and student's research field; appropriateness of topic for fixed term research.

3. Meetings, e.g. frequency of meetings; time spent on supervision; schedule for steady work for part-time students; responsibility for completion.

4. Variety of approaches to supervision, e.g. balance between didactive and inductive approach; approaches appropriate for various levels of post-graduate work; joint supervision; individual vs group supervision; reading notes, critical papers, contracts and minutes as ways of structuring supervision.

5. Personal relationships with students, e.g. confidentiality of reports; student issues, especially isolation; relationship between postgraduate students and students and non-supervisory staff; motivating students; clarifying student expectations.

Another group of topics for discussion concerned the thesis or research project directly, e.g. preparation of the thesis, standards at different levels, examination of theses. In some institutions supervisors are also examiners, and the possible role conflict was of concern to some staff. A small number of staff were also interested in discussing the selection of postgraduate students, the role of the head of department/school; supervision as part of the acknowledged teaching load; amount of pre-requisite training required of students at postgraduate level; problems of part-time, foreign and external higher degree students.

It seems evident from the above that the supervisors have many qualms about their role and that they see far more areas of difficulty than students seem to. In fact a piece of simple advice to individual supervisors might well be: supervise in the area of your own expertise, see the students regularly, give constructive help when asked and probe whenever no progress seems to be taking place.

SOME SUGGESTIONS TO PREVENT OR OVERCOME PROBLEMS IN SUPERVISION

Much of the supervisors' uneasiness about the supervision process stems from the inherent tension between the form and purpose of higher degree studies and the expected outcome of such studies: between, on the one hand, supervised research training and, on the other, a substantial contribution to learning and an original contribution to knowledge. Much of the confusion and many of the possible breakdowns in supervision can be overcome or prevented if expectations are clarified at an early stage. Institutions and departments have to articulate their expectations of students' pre-requisite knowledge and skills, of students' commitment to intensive work over a lengthy research period. Supervisors also need to clarify specific expectations concerning their professional relationship with students. Equally, students need to articulate their expectations with regard to facilities, resources, contact with the supervisor, guidance, assistance and direction.

In the workshops participants shared experiences and strategies which were used to prevent or overcome some of the problems experienced by supervisors. The following draws on these provisions, strategies, and practices which have been found to be effective in the many universities where participants had studied or taught. It also includes departmental practices which give structure to supervision. No institution, and no department or school within any institution, has a foolproof system of higher degree supervision. Yet the receptivity of the participants to suggestions made and experiences shared proves that much can be done at organisational and individual level to improve higher degree studies, and make for a more effective and rewarding supervisor-student relationship. Thus some of the suggestions can be implemented by the individual supervisor, some need departmental reorganisation or change of departmental procedures in relation to graduate students, and others need institutional support.

Acceptance of Students into the Department or School

Students surveyed in the various research studies voiced discontent and disillusionment with the departmental facilities for research and study, and with the expertise of their supervisor. It is important that procedures are established which ensure that student and department and student and supervisor are well matched. For this purpose the following practices are helpful.

The institution should obtain a profile of the prospective higher degree student. Among the information sought could be:

- referees' report on student (as is done for some scholarship applications)
- academic record; graduate records like those of the American College Testing Service
- indication of proficiency in English for an overseas student
- areas of student's research interests
- formal proposal of thesis

The department then uses this information to decide on whether the resources, facilities, and supervisory expertise are available. Screening of the student would ensure that the student could work in the department; otherwise referral to another institution might be appropriate. In the long run both institution and student suffer if a student is accepted into a postgraduate degree programme without facilities and expertise available.

The department needs to establish regular and effective communication among staff to ensure that the most appropriate supervisor is chosen. This means good communication between the head of department and teaching staff, represented possibly in a postgraduate committee. Only those staff members who are willing to supervise a particular student and are in general agreement with the topic should be selected as supervisors. Where the student has indicated only a general area of research interest, there are difficulties for the head of department in having to recommend a supervisor. The student should be introduced to and be acquainted with a number of active researchers in the department. In order to facilitate the student's choice of supervisors or of a research area, the department should provide a profile of its research activities and resources. This publication could contain:

- accurate information concerning the nature of the PhD and Master programmes
- information about the department
  * areas of staff interests in teaching and research
  * ongoing research projects
  * list of staff publications
  * staff available for supervision
  * where appropriate, topics available for research
  * resources available
  * list of research topics completed in the department
  * list of presently enrolled higher degree students and their topics
- information on living conditions and costs, on scholarships, availability of outside grants, of English classes for overseas students, of average time to complete higher degrees in the department.

This should be available in a format which can be easily circulated and should be updated at regular intervals. It should be clearly and succinctly written.

The supervisor needs to be aware of the background of the student - research experience, expectations for the higher degree studies, whether there is a specific or only general area of research interest. The supervisor needs to be aware whether the student needs access to other expertise and how it can be provided; whether there is time and commitment to helping this particular student with a specific topic, whether it is in the supervisor's research area or not. Any doubts should be communicated to the student so that alternatives may be explored: joint supervision, an external co-supervisor or an agreement that the supervisor will refer to additional expertise when required.

Giving Supervision Structure

These institutional, departmental and individual procedures for accepting a student provide the necessary framework in which students can make an informed choice and in which supervisors equally can ascertain whether they can supervise a particular student adequately. Similarly, there are structures within the university and within the department, and procedures and approaches which facilitate the supervision process. Whereas some present supervisors may have experienced their own PhD study as "sitting at the Master's feet and drinking from this fountain of knowledge", the reality of higher degree studies today does not allow this relationship very often. All the suggestions made below have been found to facilitate the supervision process for some students and for some staff. They are not meant to be prescriptive, restrictive or comprehensive. Neither most students nor most staff want a straitjacket of rules and regulations inhibiting what higher degree studies aim for - originality and development of independent research skills. It is up to institutions, to departments and in the last instance to the individual supervisor(s) and student to clarify and negotiate procedures which acknowledge mutual responsibilities so that the student may finish a thesis of high merit within an acceptable time period.

At the institutional level, either a committee or person needs to monitor admission and student progress and serve as the ultimate resort for student grievances. In many institutions half yearly or annual reports have to be submitted by the student. These are usually passed on for ent from student to supervisor, and to the head of department for signature. ..ey serve a useful purpose if they initiate action: the committee examines the reports, detects problems, advises and counsels the student, contacts the supervisor or head of department if there are queries. These reports might be merely a formality; but if they require detailed accounts of progress made, of work yet to be completed, and of problems encountered the student is forced to take stock and the supervisor, similarly, has to account for student progress. Where there are only annual reports, they could well be complemented by half yearly reports to a departmental committee which is much more aware of a particular student's research environment. The function of the reports is usually to inform the institution or department of progress made. They should, however, also have a formative function, they should provide feedback to students. Students should be able to see the supervisor's comments on their progress, be assured that progress is satisfactory, or be made aware of problem areas as perceived by the supervisor. Open appraisal during the higher degree studies establishes that the supervisor is accountable for the student's progress and ensures that the student is given written feedback at regular times.

Institutional guidelines should be made available to all supervisors and students, spelling out institutional expectations of supervisors and students and areas of responsibility. The following questions need to be addressed: Who chooses the supervisor? What qualifications are needed for supervisors? How, and on what grounds, can the student change supervisor? Are there provisions for supervisors' absences (e.g. on study leave)? What help can the student expect from the supervisor with regard to the selection of the research topic, selection of methods, with data analysis, with the actual writing of the thesis? Are there maximum and minimum times for submission of the thesis? Who selects the examiners? Can the student submit without the supervisor's consent? Equally important are the criteria for judging students' theses. What is being examined - originality? Contribution to knowledge? Demonstrated research ability? Elegance of style? Whether the thesis is publishable? Indeed, all supervisors and all postgraduate students should be provided with the guidelines which are sent to external examiners of theses.

Coursework is seen by many as helping to structure higher degree studies; it is common in North American universities and some Australian higher degree programmes require specific coursework to be completed. Coursework may ensure that the candidate has adequate research skills; in particular courses on methodology, on statistics, and on computing provide students with tools necessary to conduct their research competently.

Each department, however small, should have a postgraduate studies or research committee, chaired by an experienced supervisor. This committee or a project panel screens applicants for higher degrees; approves the topic; officially appoints the supervisor (perhaps after an informal process in which the student chose the supervisor or after some negotiation). Such committees expect regular reports from students and supervisors; they monitor the progress of students, possibly requesting reports on chapters, an outline of the literature review. Supervisors would be accountable to such a committee and be investigated should their students fail consistently or have overlong completion times. The chairperson of the committee could act as departmental ombudsman in cases of disputes. This committee might well organise staff-student seminars, possibly also invite experts in the field. Seminars can provide a forum for students to present their methodology, to discuss their data and analyses and to make available a wide pool of research skills and expertise as well as accomplished critics. Seminars are also one way of creating a scholarly community, of combating the intellectual and social isolation which many higher degree students experience. They reassure students that their own problems are 'normal'; that peers and staff have also problems in conceptualising, in analysing, in presenting research data and writing up research results.

Supervisory committees or joint supervision may provide the candidate with sources of complementary expertise; the danger of dependence on one person and of personality clashes is minimised; discontinuity through staff mobility or staff absences is equally felt less acutely. This group of people could act as first critics to the student throughout the research study: by examining the formal research proposal, by looking at the adequacy of the literature review, of methodology etc. It is important that one person has the major responsibility towards the student and towards the department to ensure that the student is not passed on from one supervisor to the next.

While university guidelines are desirable, departmental guidelines are necessary (if less common). Standard and format of theses and research projects differ considerably across the disciplines. Departmental publications should contain indications about the standard of theses at different levels; they

should provide guidelines for conducting a research project and for writing a thesis in this specific department or school.

Each department needs to examine the priority it gives to postgraduate studies and to the needs postgraduate students have for resources - a working place; a coffee room - or should staff and postgraduate students be encouraged to interact in a joint coffee room? Do they need access to telephones, to photocopiers, to mail, to travel money, to computers, to support staff, e.g. typists, technicians? Postgraduate students often are in an unenviable social vacuum, divorced from the group activities of undergraduates, not seen to be accepted by staff unless facilities are provided or they interact in joint research projects. Postgraduate students often desperately need interaction with other researchers for intellectual stimulation and affective reinforcement. If they can participate in the departmental life less drop-out of full-time students at least may be expected.

At the individual level students more often than not have a single supervisor, and one-to-one relationships tend to be private and fraught with danger of misunderstanding.

On the one hand, students report difficulties and hesitations in contacting supervisors; on the other hand, supervisors convey an uneasiness about frequency and duration of meetings, about finding time themselves and sometimes pinning down elusive students. Supervisors may try any of the following to give structure and direction to supervision. A regular, specific time for formal meetings needs to be set aside. Many students are reluctant to disturb an ever busy staff member with their own problems; many don't realise that providing guidance and giving advice is part of the staff member's teaching role and students may have legitimate expectations of regular consultations. A time period set aside for meetings, whether it be once a week or once a month not only ensures that the student has access to the supervisor, but also gives the supervisor an opportunity to constrain students who demand attention every hour every day; it helps with time planning and can be demonstrated as a scheduled student contact hour.

Again, flexibility is necessary; students often need more direction, more contact at the beginning of a project and in the final stages when the thesis is being written. Throughout the project when progress is being made at a steady rate less frequent contact may be necessary. However, it is advisable to keep the regular meeting times, using them perhaps for discussion over the telephone. Even if the supervisor sees the student daily in the laboratory, some scheduled discussion of progress is necessary. Discussing and planning an approximate time schedule for the degree programme with specified dates for the completion of particular tasks helps supervisor and student to keep the completion date in view. Written contracts or working agreements may be drawn up jointly and revised at intervals. Or supervisor and student might have a meeting book with time schedule and agenda for each meeting. Each meeting could be followed by written minutes shared between supervisor and student. The minutes could contain the areas discussed, agreements and decisions reached, time and purpose of next meeting, what the student hopes to achieve by then and what help the supervisor plans to give.

Ensuring an Acceptable Standard of the Thesis

Both student and supervisor are often uneasy about the scope and depth of research required and about the standards expected of theses at different levels. The following practices have been found helpful by some supervisors

though they are not always practicable. Reading selected theses, discussing these with staff who can judge whether they were accepted as appropriate gives some ideas about the standard required. Supervisors who encouraged students to begin writing early were able to recognise and rectify deficiencies in background and difficulties in conceputalisation early; and students also got a sense of achievement and progress early. Supervisors often are required and widely expected to read drafts critically, and, if necessary, seek other expert opinion. Ideally there should be continuous evaluation of progress made. Some supervisors encouraged students to present their research at national and international conferences. Others also encouraged students to publish in refereed journals during the course of research. The feedback from the audience and referees provided additional critical comment. Supervisors need to be 'plugged in' to the discipline at national and international level so as to be able to assist the student properly in this way. Where the student's field is outside the staff area of expertise, provisions for external supervision need to be made; introduction to colleagues elsewhere are necessary so that the student may participate in the informal network of national and international scholars.

The extent to which a supervisor should make a direct input into the writing of the thesis is a matter of dispute. Whereas the supervisor should read all drafts and the completed draft before submission and criticise constructively, too much actual rewriting might impinge on the student's claim to originality and independent achievement. The supervisor may be expected, however, to anticipate examiners' criticisms and communicate them to the student. A seminar to a critical audience before submission, a defence of the thesis, helps to expose weaknesses in argument.

CONCLUSIONS

Supervision styles vary from the strongly directive to the laissez-faire, with the supervisor waiting for the student to ask for advice. If the term 'supervision' is to mean anything at all, it is clearly the supervisor's responsibility to see that the student tackles a research topic which is suitable for research training, which promises new insights, and which can be completed within reasonable time. In the end, it is the supervision process as well as the thesis which is being examined. However, there is no best way of structuring supervision. The aim is still to accompany the student on the journey to competence in independent research work, assisting, guiding, and directing or interfering where necessary. This aim holds for those students who already have research skills, who are already independent learners, who like to work autonomously; and for those who still need a lot of direction, a lot of encouragement, and a lot of feedback. The starting point for each individual student is different; thus the supervisory process must differ for different students. It is the outcome that counts - the independent researcher.

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Ph.D. Education for the Nineties

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ABSTRACT
The Ph.D. degree in Australia, established some three and a half decades ago, has become recognised internationally as of high professional standing. However, attitudinal deficiencies in individual graduates, first recognised in the Fensham Report, still need to be addressed. Serious consideration needs to be given to the introduction of relevant course-work within the degree programme to broaden the intellectual base and to offset premature specialisation. A corresponding reduction in the extent, but not the quality, of the thesis should be envisaged. Advantages are seen in interspersing employment between Honours degrees and Ph.D. commencement and greater emphasis should be given to counselling of candidates embarking on a Ph.D. programme. The quality and character of Ph.D. programmes is influenced by the sole-supervisor model, constraints on university research funding and the career expectations of candidates. The emergence of joint university-industry companies offers new opportunities for entrepreneurial and creative Ph.D. graduates in small firms rather than, as earlier, in large corporations.

New initiatives are proposed to build on the successful base of existing programmes to alter the balance in favour of greater intellectual development and awareness of Ph.D. graduates.

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INTRODUCTION

The Ph.D. degree has been effectively available in Australian universities for only three and a half decades. In that period, there has been a remarkable expansion of the research function of the Australian universities primarily stimulated by the Murray Report and the expectation of sustained economic growth.

The remarkable feature of Ph.D. programmes is that there has been little change in the basic structure - and presumably objectives - of that important feature of postgraduate education. Yet we should never be completely satisfied with the style and quality of the education offered to our young. Points of dissatisfaction, when properly defined and analysed, can serve as focal points in our long-term aim of achieving more appropriate educational goals.

An additional dimension to Ph.D. education has been the recent espousal by the Commonwealth Government, elected in March 1983, of the important role to be played by higher education in contributing to the economic restructuring of the country. There is an anticipation that the research of Australian universities should contribute positively to the transfer of technology to existing industries and the creation of new industries. Recently this general view has also been adopted by the Opposition in its Science and Technology Policy.

This article is therefore written in the context of the changing economic circumstances and the expectations for the 1990's. Emphasis is placed on Ph.D. graduates in science and technology but many of the principles and issues are equally applicable to those in the humanities and social sciences.

FENSHAM: A DECADE LATER

A decade ago there appeared the report of a committee headed by Professor Peter Fensham entitled Ph.D. Education in Australia: the Making of Professional Scientists and produced by the Australian Academy of Science. It is an important document, being one of few sociological studies of graduate students in Australia. Though dealing primarily with that ubiquitous character, the Ph.D. candidate in chemistry, it has been used extensively as a case-study and reference in subsequent debates, there being few comparable studies in other areas of such substance. It is a measure of the inertia of the system that it is still pertinent a decade later.

A clear message emerging from the so-called Fensham Report is that the Australian Ph.D. system, despite its considerable contribution to the staffing of Australian higher education itself, might be considered insensitive with regard to the relevance of basic science research to the perceived needs of local industry. From the point of view of industry the main purpose of employing highly-trained people in significant numbers is to aid the more rapid solution of complex problems as well as to develop and implement new products and processes.

Since the prime aim of industry might be defined as making money the justification for science and scientists in industry stems from this aim being achieved more readily through their presence.

Success in industrial science is seen to require the ability to identify problem areas, the ability to handle unstructured problems, the ability to work effectively with other people in groups, and the ability to communicate. It is pertinent to ask whether the traditional structure of graduate education in Australia does achieve these goals relevant to industry, or if the system does, as it has sometimes been accused of doing, produce social and occupational isolates. Equally it should be questionned whether these abilities and skills are also relevant to careers in higher education itself, which with the ageing structure of existing staff, will resume as an important employer of Ph.D. graduates in the 1990's.

Any changes to be made to Ph.D. programmes should be based primarily on basic educational grounds to enhance the stature of the individual graduate irrespective of ultimate employment. This criterion is too often relegated to minor consideration in the discussions of possible adjustments to our system; the educational development of each research student as an individual should be high in our priorities. Conversely an uncritical acceptance of criticism from industrial managers is to be resisted if for no other reason that management in Australia has recently been criticised itself for its lack of forward thinking to anticipate the challenges of the late 1980's and the 1990's. We should avoid casting our Ph.D. graduates of the late 1980's in an obsolescent mould thought appropriate for the 1970's.

The Fensham Report indicated that a high overall number of research managers are satisfied with both the specialist knowledge and skills of Ph.D. graduates entering their employment. This satisfaction is high in the three main categories of employment for these graduates, namely, industry, C.S.I.R.O., and other Government instruments and departments. These views have been reinforced in subsequent years by the good standing and acceptability of Australian Ph.D. graduates in the international sphere of research. This achievement is too often overlooked when there is criticism of our graduate (and especially Ph.D.) education programmes, and the changes suggested should be viewed in this context. However it is also important to bear in mind that the Fensham report showed only a small percentage of managers are entirely satisfied. For the majority, satisfaction is only moderate and the criticisms of research managers are at least as relevant as they were a decade ago.

ATTITUDES

The Fensham Report noted one-third of all research managers seeing a need for Ph.D. graduates entering their employment to undergo a re-orientation programme. Among industrial research managers this figure rose as high as 45%. Furthermore, this re-orientation might be considered necessary not only in terms of the graduates' technical interests, but also in the more general area of their social adaptation. Research managers within

large corporations are commonly interested in recruiting people combining the best virtues of committed scientists with the ability to fit into the existing organisation structure with minimal disruption. Beyond these two paramount considerations highly-esteemed qualities include, a desire to achieve useful results, personal drive, and orginality of thought. Desired general-attitudinal characteristics are initiative and persistence, an understanding of people, an enthusiasm for the aims and problems of industry and the particular organisation, and an understanding of economic viability, again in industry and the particular organisation. It is in this last respect, together with skills in communication, that Ph.D. graduates are most commonly seen as being deficient. It is also illustrative to consider other perceived deficiences in order to clarify the nature of the criticisms actually mounted by privately based research managers. Ph.D. graduates are also seen as lacking in, the ability to adapt their solutions to the practical exigencies of time and place, the ability to communicate and appreciate the role of persuasion, and the ability to seek out problems rather than have them presented 'on a plate', so to speak. Further, the graduate scientist based in the private realm is seen as needing to be concerned with problems of the real world of industry, viz., the market, rather than a perceived 'academic' preoccupation with problems of his or her own making.

While this comprehensive list of perceived deficiencies in our Ph.D. graduates may appear damning of the system as a whole that produced them, this is, in fact, not so. It should be reiterated that, overall, the views of privately-based research managers indicate their satisfaction with the level of purely technical knowledge and skills of our Ph.D. graduates. The inadequacies noted lie primarily in the area of the social skills and attitudes and in the breadth and flexibility of the professional interests of our graduates. It is the social aspects of graduate education which assume importance over the purely technical aspects, in the call for improvements in the general education of the individual candidate. The fundamental question raised by those in industry, in addition to those in the education system itself is whether the research project, traditionally under one supervisor and concerned primarily with one major research problem, is the proper education for the individual in the closing years of the twentieth century. This question, it should be noted, is equally pertinent to the education of Ph.D. candidates in the humanities and social sciences as it is in science and technology.

COURSE-WORK

When considering the state of graduate education in Australia, it is necessary to recognise the two general modes of teaching and learning: the traditional post-graduate degree based virtually exclusively on research, and the increasingly important Master's degree by coursework, which in fact contains varying proportions of a research project. Post-graduate diplomas are here taken as a subset of these coursework degrees. Already very important in graduate education, this second stream of coursework degrees embracing aspects of research will become more important in the future as universities provide for the continuing education of graduates in their own professional area as well as offering the opportunity to diversify or to direct their skills to new areas.

The need for this function might result from potential redundancies in major industrial areas, or, more creatively, from a conscious decision by the graduate to move into new areas of professional expertise. Masters degrees and post-graduate diplomas by coursework make up a very important component of that continuing education. There is also strong evidence that many graduates are seeking shorter courses and more specific courses which emphasise the updating and diversifying function as relevant to their own professional development. One can anticipate therefore that the Australian higher education system will have developed an extensive network of course-work modules appropriate for the professional continuing education of mature graduates. Is this network of relevance to the fledgling Ph.D. candidate?

The lack of any significant formal coursework within our Ph.D. and Master's degrees by research has continued for three decades. The focus of our Ph.D. type research degrees continues to be the research project, and this is almost the only medium by which education is accomplished. The end result of the process is the thesis which is then assessed by examiners, usually without an assessment of the candidate's general professional knowledge. This structure rests on a four year degree (traditionally a B.A. or B.Sc. together with an additional honours year) as being adequate to provide a proper overall education for the graduate as he or she proceeds to post-graduate research. This assumption needs careful examination. From the questions raised by industrialists and others noted earlier, we might be entitled to ask whether such a research project tackling one major problem under a single supervisor really does provide for the proper, overall education of the individual. There are real technical needs such as fluency in statistics, computing and a whole range of other professional skills which are essential to the professional education of, say, a biologist. In the cases of well supervised candidates these needs are met by direction of the candidate to specific courses but there are good grounds for setting down explicit objectives which could be met from the network of course-work already in existence. But the extent of this course-work need not be as extensive as in North America since the degree of academic preparation of candidates is different in Australia.

In the 1970's, it was conventional wisdom to regard the Ph.D. programmes in humanities and social sciences as characteristically solitary-existence whereas those in science and technology enjoy greater socialisation through participation in the work of research teams. Those science teams have shrunk in the 1980's and many science candidates are now also solitary researchers. In all cases the inclusion of course-work would not only enhance background skills and broaden specialisations but provide much greater opportunities for corporate and peer group learning.

PERCEPTIONS

The expectations of students, and no less postgraduate students, influence the outcomes of their educational experience. The characteristics and perceptions of graduate students have been

well-documented for the British case by Ernest Rudd's The Highest Education: a Study of Graduate Education in Britain. Rudd researched students' motivation for embarking on graduate studies in the areas of arts and social sciences, pure sciences, and applied science, and features of his study are very likely applicable in the Australian context. Rudd's analysis shows that most students entered graduate study with the expectation of an academic post in mind, especially among arts and social science students for whom the opportunity for industrial or commerical careers are relatively restricted. However, Rudd also found inertia to be a major reason for students continuing into post-graduate education. Reasons such as "I could not think of what else to do", "I enjoy university life," or "it is the usual thing to do with a good degree" together with the influence of parents and peer groups on students' perception of the Ph.D. as a very laudable social custom all serve to indicate that for many students continuing into post-graduate education is akin to joining an educational conveyor belt at an early age and proceeding without considering alighting.

Another important and allied aspect of many students entering graduate education is the perception of the Ph.D. as the academic equivalent of an Outward Bound course. Especially for the graduate student in the social sciences or arts it is seen very much as a case of 'in off the deep end' or SOS ('sink or swim'). Involvement with the supervisor is often rather slight both in the selection of the research topic and in general supervision through the year. This view depends, of course, very much on the type of course. The nature of investigations in the natural sciences is quite different and often entails a very frequent interaction between supervisor and student, often on a daily basis. The opportunities for social development through peer group interaction as well as with the supervisor vary enormously.

Among the arts and social sciences students surveyed by Rudd, 76 percent believe university teaching is their ultimate career and relatively small numbers are interested in other areas such as university research, industrial research, the public service or local government. Economists, however, do see industrial research and the public service as openings. There is also an increased proportion of science students seeing industrial research and development as a possible future, but the figure is still not very high in Britain. This is also one of the findings of the Fensham Report which indicated that teaching accounts for a high proportion of career hopes. We are acutely aware that in Australia opportunities for employment in university teaching at present are very slight, although the prospects in the 1990's will brighten as an increasingly aged academia retires at rapidly rising rates. But, in looking at the Australian scene Fensham confirmed that many graduate students here held no clearly defined choice of career but succumbed to the educational 'conveyor belt' effect, or were attracted to the status of the Ph.D.

Of the students surveyed by Fensham, the greatest personal benefit was seen to be derived from the Ph.D. experience derived from interaction with their supervisor; this is especially so in the sciences with their very close supervisory role, and this throws considerable responsibility on the individual supervisors involved. Many science Ph.D. candidates linked their own perception of probable careers with the career of their

supervisor, a finding understandable because of the nature of the research project which is designed for science candidates by the supervisor to a marked extent. Interestingly, Fensham found that the attitudes of a surveyed group of scientists aged 30-50 show very similar social attitudes as newly emerging Ph.D. graduates, although the former group was some 15 to 20 years older. Thus graduates tend to have a highly idealised concept of their profession and, at least among the chemists, academic employment was high in their expectations. C.S.I.R.O. was much lower in their career choices but still much preferred to colleges, all of which were much higher in preference than industry.

CONSTRAINTS

The constraints upon the educational institution also affect the quality of the educational outcome for postgraduate students. The existence of post-graduates within a university provides a de facto supply of cheap teachers in all areas from the arts to laboratory work in the sciences and this supply has been used extensively by Australian universities. This part-time teaching role reinforces the perceived role of an 'academic apprentice' which provided a rationale for operating the system when future academic employment prospects were good. Like all apprentices, employment prospects are not good but the apprentice role implicitly remains.

The socialisation of the Ph.D. candidate is further rei forced by the fact that the Ph.D. programme has points of important international relativity both for the supervisor and the graduate student. The latter is attuned to the fact that he or she must ultimately seek peer approval by publishing in appropriate journals to be judged on the international circuit. This has an important influence on the character of the research projects undertaken, be they in arts or the natural sciences. Few accolades tend to be given the projects designated merely 'industrial' or 'commercial'.

Candidates for the Ph.D. and research masters degrees form an integral part of our universities' research activities. Without graduate students the amount of research done in Australian universities would be considerably reduced. This stems, largely, from the research student having longer periods of time available to undertake uninterrupted research, than does the academic. However, that is not to say that such students are free from the constraints of the time available for their education. These constraints are partly defined by the duration of scholarships. This has been reduced from what was typically a five year period a decade ago to three and a half years. This must necessarily also put constraints on the introduction, implementation and role of formal coursework in the education of post-graduates. Consideration must be given as to whether the multiple demands on Ph.D. candidates can realistically be fitted into existing time-frames.

The amount of money spent on research as identifiable research expenditure in Australian universities also has important ramifications for the progress of research. Money for equipment and for libraries is

crucial to post-graduate students' progress since it affects the quality of work as judged on international standards. Figures from the Commonwealth Tertiary Education Commission (C.T.E.C.) Report for the 1979-81 Triennium showed that in 1966 almost $7,400 per research worker was spent in our universities, whereas by 1979 this had deteriorated to one half of that figure, namely, $3,800 at the same price levels. This dramatic fall in the proportion of our current money per research worker spent on research has recurred at a time when all areas of scholarship are increasing their demands in international domains. We are expecting Australian research to be accomplished at contemporary international standards with rapidly dwindling resources. This is bound to be a considerable constraint on the quality of graduate research, and the quality of educational outcome for postgraduates.

Constraints also operate in terms of the socialisation of the graduate students and their resultant behavioural patterns. Supervisors' perceptions of the research they are doing is often very limited by the supervisors' own career programme. They were educated in universities, then went to other universities, and finally returned to universities in similar countries. Their involvement in areas such as industry tends to be quite small, a deficiency that could be ameliorated by the use of study leave in industry, at least for some academics. More generally, if we are to enhance the personal qualities of our post-graduates we should take steps to develop greater diversity of interest within the post-graduate in all fields of scholarly activity. Our present Ph.D. programmes, however, tend to encourage a convergence of interests in the post-graduate student. The Ph.D., when undertaken within a research group, as distinct from the traditional isolated experience, has the important merit of providing intellectual competitors. This would create benefit derived from peer group activity as distinct from the research supervisor's activity, and group work is also important in reducing the post-graduate's sense of isolation. Further, expanded group activity helps individual candidates understand the much broader aspects of their discipline.

CAREERS

The traditional career prospects for the Ph.D. in science and technology areas has been in large institutions whether they be universities, C.S.I.R.O. or industrial firms. The socialisation patterns expected from these institutional managers is ability to function cooperatively in that large organisation - or sublimating individual characteristics and conforming to institutional objectives. Yet, paradoxically, the most enriching personal outcomes from a challenging Ph.D. programme should be a highly developed sense of independence and creativity.

Recent government espousals of the need to transfer discoveries from universities to industry place a premium on an entrepreneurial spirit in new and relatively small organizations. In turn, this places a premium on personal, and sometimes, idiosyncratic creativity. The emergence of joint university - industry companies to exploit university discoveries and the formation of teaching companies for industry thus offer new

directions to career prospects for some Ph.D. graduates. One can expect increasing numbers of university development activities emphasizing the D component of R & D as Australia struggles to achieve re-structuring of the economy in the face of unrelenting international competition.

These developments will however emphasize the need in our future Ph.D. graduates to achieve high international standards in personal research accomplishment yet provide a broader background of intellectual understanding and the encouragement of wider social attitudes. To these ends, I would suggest the following new directions:

NEW DIRECTIONS

1. Encourage Ph.D. programmes to embrace more than one type of project with the possibility of supervision across disciplinary boundaries.

2. Reduce the content but not the standard of the Australian Ph.D. thesis (which is greater than those in North America, Britain and much of Europe) to allow the introduction of relevant professional course work, probably available in exisiting Master's programmes.

3. Include some modules of business management course work to enhance the effectiveness of Ph.D. graduates in commerce and industry.

4. Loosen the career links between supervisors and Ph.D. candidates with greater use of supervision committees to provide multiple role models and improve socialisation of candidates.

5. Improve counselling of candidates at the entry point to Ph.D. programmes and encourage employment between completion of Honours degree and Ph.D. entry.

In advocating these new directions, however, the success of the existing Australian Ph.D. programmes should be recognised. It is on this successful base that these new directions should be built to achieve a change in balance more favourable to the overall educational development and intellectual awareness of individual candidates.

Future Strategies for Research and Development

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ABSTRACT
This paper considers the seven research processes identified by Anderson and Eaton in a recent review of Australasian higher education research from 1940 to 1982. Two further dimensions are added in order to discuss likely trends and emphases in higher education research and development in the next decade. The paper concludes with a discussion of the role of academic development units in the conduct of research.

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The first two issues of Volume 1 of this journal carried a comprehensive and excellent review of research on higher education in Australia and New Zealand from 1940 to 1982 (Anderson and Eaton, 1982 a; 1982 b). The publication of that review, especially its final analysis dealing with the way in which research contributed to higher education policy and action, signals the need for some speculation on the future strategies for research in higher education. No attempt is made to forecast actual issues which will arise over the next ten years for new topics emerge and decay repeatedly with the varying complexion of the government of the day. This paper begins where Anderson and Eaton finish - with their seven processes by which research may contribute to policy and action in higher education, and provide a framework, from which to chose, to illuminate the research problem presented to us. Brief sketches of these processes are given below.

1. Sensitising. Intimate association of the policy maker or teacher with the research and researcher.

2. Social Book-keeping. Accumulation of records to form a data base.

3. Legitimation. The use of research findings to legitimate conclusions reached on other grounds.

4. De-mythologising. Challenging any tenacious belief or fad to highlight important ignored aspects or to force a re-formulation of the question.

5. Enriching. Establishing a more precise vocabulary as an aid to conceptual clarification.

6. Evaluation. Accountability of the unintended as well as the intended consequences of actions seeking to achieve social/educational goals.

7. Illuminative. Curiosity-based research where no practical pay-off is intended.

These seven processes are used as the framework for speculating about the future direction of research and development (R & D) in higher education in Australia. While this typology was found to be useful, it is not the only way of conceptualizing the interaction between research and policy/action. One could, for example, consider the influence of research on the change process itself under categories like direct influence, indirect influence, change in the absence of any recognizable research influence and no change at all despite enormous research effort. When combined with the Anderson and Eaton typology this would lead to questions like 'What will be the direct influence of evaluations?' or 'What are the indirect effects of legitimating research?'

Another typology might be based on resistance to change by individuals, organizations and governments. This would lead to asking a different set of questions. Clearly these different typologies are not independent. Despite this, it has been useful in developing this paper to set up the grids which cross two different typologies and to speculate about each cell in turn. These grids are not reproduced here; partly because this would probably lead to distracting discussions about the constraints they impose and partly because they were simply tools used to stimulate ideas. Their use is raised here because just as the writer found the approach useful so might the reader.

Sensitising. So let us take the sensitising process of R & D and consider its possible influence and the possible resistance to it. Because of the consultative, collaborative nature of sensitising research there is likely to be a strong direct influence on the team, both researcher and client. As the relationship between the parties develops the indirect influence is also strong in sensitising each other to what may have seemed peripheral issues. For example a relationship between a consultant and an anaesthetist about his teaching of resident anaesthetists had a direct influence on his teaching but has also involved indirect influences on teaching at the bed-side (Hore, 1974) and in the operating theatre (Lambert & Paget, 1976) and to the design of patient-monitoring equipment (Paget & Lambert, 1981). From this actual example one can see the potential power of sensitising research to bring about change in individuals, in the practice of their discipline and in the system within which that discipline is carried out. It would be unusual if the sensitising system did not lead to change in the client since the client has in most cases requested assistance or at least been intimately involved in the early stages of the process. However a paper published in 1982 (Clark & Callister) drew attention to some rationalisations in teachers of engineering which initially seem complex but which explain many of the situations in which academic developers find themselves. Clark and Callister explain comments like 'I just don't have the time to spend improving my teaching', or 'What would a non-physicist know about teaching physics' or 'Well, it may work in a C.A.E.!' as examples of academics evading personal responsibility for their own teaching. Their excuses and rationalizations seemed to be their way of saying 'I am committed to improve my teaching but I am resisting the commitment and to do so must see myself as not resisting it. Therefore I don't perceive it as my fault that I'm not improving'. (Clark & Callister, 1982, p.257)

Most frequently sensitising leads to change in the individual client (and researcher) and in those systems in which the clients hold or progress to influential positions, to change in the system. For example the anaesthetist was able to change systemic procedures because he became Director of Anaesthetics.

An indication of resistance at the individual level has been given in the engineering example, but sensitising infrequently generates resistance at the systemic or governmental levels, as one awakens sleeping dogs.

The type of research in this sensitising system is interactionist, often with an N of 1 and not considered to be research at all by some physical scientists. It requires a high level of interpersonal skill and a case study approach. It is time consuming, frequently not amenable to publication, but it is a major role of R & D staff and one which will increase in importance if our institutions are to meet emerging social needs. Most institutions have been negligent in their long-term planning; R & D units have to be the sensitive antennae of the institution, to pick up weak signals from around the world and inform the institutions whether those signals help or interfere. Like a good quality receiver, a good R & D unit can pick up, separate and make sense of strong and weak signals, whereas a poor quality receiver is unable to separate the message from the noise. Having received it, transmission to some person or body with executive power is crucial if this message is to lead to action. R & D units have often had trouble with this phase of their activity. To conclude this section on the sensitising process, my prediciton is that this type of inquiry will increase. Two critical factors for consideration are the quality of the receiver and the adequacy of the onward transmitting

network.

Social Book-keeping. Social book-keeping, or Data-banking is one form of information gathering which can have direct and indirect influence leading to changes in administrative and teaching processes and ultimately changes within the system itself. Good examples of social book-keeping are the surveys of students' educational and sociological backgrounds collected at the University of Melbourne and Monash University since the late 1960s. In the case of the Monash data, inspection in the middle 1970s showed an increasing number of mature aged students. This raised a number of questions like 'Who are they?', 'Why do they come?' 'What problems do they have?', 'How can Monash help them?' The answers to these and other questions were disseminated (see for example Hore & West, 1980). The direct effects were a better understanding of the phenomenon, changes in selection methods and orientation procedures and the establishment of a meeting place in the Student Union Building for mature aged and part-time students. An indirect effect was that one could see a change in the political climate on campus towards mature age students. One example being a barbeque for adult students and their families during orientation week.

This example shows that social book-keeping is useful as a monitoring device to alert institutions to changing trends and to direct limited research capacity towards worthwhile avenues of exploration. Generally this sort of research generates little resistance at any level, except when questions of cost in relation to direct/immediate relevance are raised; then social book-keeping may be at risk for the utility of the data-bank may not be realized until the information has had time to develop from the first base-line. It is expensive, but I would suggest that investment in this kind of research should continue, especially in the current political climate when questions of access and opportunity need to be addressed. While the early phases of data banking are 'number crunching' this technique must give way to more ethnographic methods if we are to understand the reasons for deviations in, or stability of, the trend lines from our data bases. Traditionally data bases have concentrated on student data, and even here there has been no national or even state-based statistics on any variables other than enrolment data, sex, age, progression rates and home location. Later in this paper the need for a comprehensive data base on staff will be proposed.

Legitimating. This is probably one of the most difficult tasks for the worker in R & D, since the 'right' answer is known before the investigation is carried out. It may, as Anderson and Eaton (1982 b, p.115) pointed out, provide an opportunity to enter the debate, but what if the researcher comes to a contrary conclusion? By definition this is not legitimating. So the initial question is an ethical one for the researchers (if they recognize the nature of the task being requested). Can this be called research? The answer is 'Yes, if...'. The 'if' list is quite long; if the researcher is free to design the research without restriction; if the researcher can draw any sample; if the researcher has the right to publish the results independently; if the researcher has the right to see publications from the sponsor drawing on the results, before they are issued, then I would call it research. These provisos also avoid many of the ethical problems associated with legitimating research. This writer has had one experience which could fall into this category, an investigation of drink-driving research funded by the Australian Associated Brewers (West & Hore, 1980). What could have been a legitimating function proved not to be. All the provisos above were accepted and the brewers agreed to finance the publication of the findings sight unseen.

In this case there was an intermediary group of medical professors who acted as a Research Grants Committee for the brewers. So, given these precautions there should be little resistance from individual researchers unless they are forced by their institutions to go through a charade called 'research' and come up with a pre-determined result. There is little doubt that information is needed so that departments, institutions and governments can make valid decisions. The legitimating system of research throws into sharp focus the need for tenure.

De-mythologising. In some ways de-mythologising is the antithesis of legitimating, but it is more than this. The influence of de-mythologising depends on the strength of the myth in the minds of the people in power and secondly the ability of a de-mythologised myth to reappear in a mutated form. Why is this so? Let me draw on two sources to try to answer this. The first from psychology, the theory of cognitive dissonance (Festinger, 1957) and the second from a classic guide for the young academic politician (Cornford, 1908). Cognitive dissonance refers to a relationship between ideas or beliefs which do not fit together. An example of this is the car-buyer who finally decides to buy a Holden Commodore after vacillating between the Commodore and the Falcon. After the purchase motor writers praised the Falcon and criticized the Commodore. Our buyer's dissonance is generated by the decision to buy and the emerging reports. The research on dissonance shows that the person seeks to reduce this dissonance. Our buyer has several options: to sell the Commodore and buy a Falcon; to suffer attacks of selective blindness or deafness to the dissonant information; or to challenge the capability of those responsible for generating the dissonant information and thereby its credibility. The last two ploys are more common when faced with dissonance-inducing information and are especially prevalent in academic settings when the topic of staff development is raised. You may wish to go back to the quotation from Clark and Callister (1982, p.257) given earlier and examine it again using cognitive dissonance as the framework. There is one myth 'That institutions are places of rational discourse' which Cornford (1908) helped to de-mythologise in his small book, which all R & D people should read, called Microcosmographia Academica. A small quotation will give you the flavour of this still relevant book. (p.2)

> I shall take it that you are in the first flush of ambition, and just beginning to make yourself disagreeable. You think (do you not?) that you have only to state a reasonable case, and people must listen to reason and act upon it at once. It is just this conviction that makes you so unpleasant. There is little hope of dissuading you; but has it occurred to you that nothing is ever done until every one is convinced that it ought to be done, and has been convinced for so long that it is now time to do something else? And are you not aware that conviction has never yet been produced by an appeal to reason, which only makes people uncomfortable? If you want to move them, you must address your arguments to prejudice and the political motive, which I will presently describe.

This may help to explain why your well-reasoned de-mythologising report had no effect whatsoever. The de-mythologising process will always be present but one needs more than research skills to conduct it successfully.

Enriching. This process of research is concerned with establishing a precise language so that users will know exactly what is meant when particular terms are used. The direct influence of this is positive; the indirect influence is more subtle as concepts become clarified and not always positive because careful definition requires restrictions and provisos so that a researcher's answer to an administrator's question sounds like evasion i.e. 'Yes, if ... but no, if ...' To resolve the 'if' statements requires a political or value judgement which may put the researcher back into a legitimating role. Enriching research does not in itself influence institutions or practice, although without its clarification collaborative work in interdisciplinary areas would be hindered. During the process there will be debate but, with negotiation on meanings, little resistance to this sort of research from individuals or organizations. This process is necessary and continual, but has an associated danger in the growth of in-group jargon which acts as a barrier to those people not in the 'in' group. Jargon is useful as a shorthand provided everyone has access to the dictionary or glossary of terms.

Evaluation. Most people in R & D would have no doubt that this strategy will increase into the 1990s. The movement for evaluation has been driven by the need to demonstrate that the government, sector, institution, department or person has used public monies wisely and frugally. Evaluations are intended to have a direct influence either in the formative sense of assisting the group being evaluated to achieve its aims, or in the summative sense of seeing whether the group has overcome some hurdle of adequacy or success. There have been few evaluations of evaluations in Australian higher education, although one senses a considerable degree of 'tokenism' in evaluations which tends to reduce their direct influence. In a slightly different field, King (1983) has examined the direct and indirect impacts of twenty evaluations of aid training programmes funded by the Australian Development Assistance Bureau. Since these programmes are undertaken and conducted by Australian universities and colleges they are not too different from regular higher education programmes. King considered the direct benefits of the evaluations to be quite limited although their indirect effects were considerable. The nature of the indirect influences of evaluation in higher education is largely unexplored and is one area that may interest researchers into the next decade particularly case studies of staff morale in the group being evaluated. This question surfaced during an evaluation of the Monash Higher Education Advisory and Research Unit when our morale vacilliated between incredulity and despair! But it is not a case study one can conduct on oneself. It requires a sensitive observer-interviewer who can probe the feelings of evaluators and evaluatees. This is different from the meta-evaluations recently discussed in the North American literature for these evaluations of evaluations tend to compare strategies or processes used in evaluations rather than the residual feelings during and after the evaluation process in the various participating groups (Stufflebeam, 1979). Individual resistance is certainly possible from the evaluatees but this should reduce directly with the quality and sensitivity of the evaluation strategy. Some evaluators may be less concerned with the feelings of the providers of a service than with its impact on the consumers. I am suggesting that a psychological component needs to be added to the more usual politico-economic framework.

Resistance at departmental or institutional level to evaluation decreases in times of recession, so one would expect more evaluation studies. They are time consuming, costly, process oriented and not amenable to publication, and suggestive rather than prescriptive of the 'right' solution. Educational

R & D involves people not goods and therefore pseudo-economic evaluation models may highlight solutions which are socially unacceptable. For example in a hospital where costs were to be reduced a study showed that a significant saving could be made by omitting the early morning 'wake-up' cup of tea. What had not been considered was the effect on the providers of that service and the industrial action which followed the decision to abolish the 5 a.m. cup of tea and the overtime payments it had attracted.

From observation of the outcomes of evaluations at all levels, individual and system, one wonders whether substantial and fundamental change can come from any educational evaluation. Certainly educational evaluations can be helpful in suggesting changes in procedures, techniques or policies, but the actual decision to attend to or to disregard those suggestions is a political one. The researchers' initial step should be to read Cornford and then assay the sponsor's prejudices and political motives.

Illuminative. Illuminative or curiosity-based research was the seventh process in the Anderson and Eaton (1982 b) review. Direct influence is not intended in this 'pure' research. There may be significant indirect influences but these are not intended either. This form of research encounters little resistance from individuals or organizations especially in universities who see illuminative research as their 'raison d'etre' and will actively seek funds for its continuance. For workers in educational R & D curiosity-based research has decreased with the demise of Education Research and Development Committee and the difficulty of attracting untied funds. In its place we have seen an increase in contract research, either by open tender or via some closed network; usually for research described as 'legitimating' or 'evaluative' but seldom merely to satisfy a researcher's curiosity.

Under this sub-heading of illuminative research I want to consider the role academic development units might play for academics outside the units and then staff within units. With the increasing expense of overseas travel many academic staff are staying in Australia and even on their own campuses for their sabbatical leave. The main difficulty of staying in one's department is to remain aloof from the activities of the department and the invitiations to participate which your presence encourages. Units may provide a haven on campus for staff on study leave where they can spend time in the multi-disciplinary atmosphere available in most units. The benefits to the unit staff are too obvious to elaborate.

Within higher education, unit staff are in a unique position since curiosity in their field of interest (higher education) is expected as part of their normal duties. They are more free from regular teaching commitments than other academic staff and if they are shielded from some of the service demands of the institution they can initiate and follow hunches and hypotheses. This outward-looking attitude is necessary if researchers are to be sensitive to the emerging needs of an institution, and requires a creative, 'What if ...?' and a 'What is ...?' The key to this approach is the researchers' successful anticipation of potential questions and the data required by the institution before the client has perceived the need for the information. So what started out as curiosity-based research becomes transformed into a sensitising report or discussion paper.

One likely topic for increasing research and 'What if ...' speculations is the professional development and career path problems tertiary staff in general and staff developers in particular. We have to know what effects the lack of promotion and mobility are having/will have on the majority of our academic staff, who are in their early forties and at the top of the Senior Lectureship range. An early lead was given in the research reported by Powell (1981) and Powell et al. (1983) and this lead must be followed so that we can be active in alleviating what could be a problem of epidemic proportion. Informal measures in Health and Counselling Services show an increasing number of staff presenting with stress-related complaints so there is no cause for complacency. Many staff developers are sensitive to the conflict between one's career in one's basic discipline and the helping role in which the interests of the person being helped are paramount. This conflict arises because of the lack of career paths in R & D units and secondly because the majority of the research undertaken is not publishable and even if it were the outlets for such works are few. Further the published works are often of marginal interest to readers in one's basic discipline. The helping role is time-consuming, intimate and frequently has some urgency about it. This requires the consultants to decide whether to put their own interests above the interests of the client. In some ways the lack of staff mobility, the slowing down of the promotion race and the ageing of R & D workers may bring about a decrease in the desire for publication (for publication's sake) and a corresponding increase in deep involvement in the clients and their problems. The majority of researchers/developers work in situations where tasks and projects vary almost daily and where the next telephone call or visit could provide a new challenge. While rewards from middle managers may be few and grudging, motivation is maintained by meeting these challenges successfully. This prevents the majority from suffering from what will prove to be the curse of academic life into the 1990s, 'burn-out', apathy and stress-related illnesses. In recent years the literature in these areas has increased markedly, for example Gmelch, 1982, and this suggests that collaborative research with Health and Counselling Services will increase in the next decade. Staff 'burn-out' is the single most serious affliction which could affect academia and therefore must be an area of increasing investigation.

Staff development is about change. Change always requires an imbalance or disturbance before equilibrium is re-established. It is usually a political process and one does not need a crystal ball to foreshadow a turbulent period ahead for tertiary education following the Commonwealth Schools Commission's Participation and Equity in Australian Schools (1983) and the associated report that the Federal Government wants to abandon the Higher School Certificate as the only qualification for entrance into universities (The Age, Dec. 15, 1983, p.3). If there was ever a topic to challenge researchers, this is it, pursuing quality and enhancing equality against a back-drop of political forces and higher education's in-bred conservatism.

CONCLUSION

> That is the biggest fool thing we have ever done ... The bomb will never go off, and I speak as an expert in explosives.

Admiral William Leahy's comments about the atomic bomb to President Harry Truman show how wrong professed experts can be in their predictions but at the expense of joining Leahy I will offer some conclusions to prompt debate. Sensitising research is crucial and will increase; the success of this will depend upon the ability of the researcher to anticipate events, to be sensitive to political motive and to have the ability to communicate the findings to decision makers. The need for social book-keeping will also increase, linked to one's anticipation of the need for data on different populations. There will be an increase in the collection of qualitative data in an attempt to understand phenomena emerging from more quantitative analyses. De-mythologising will remain as important as it has been in the past, for as long as myths continue to be generated. Enriching research is unavoidable if we are to understand one another without prolonged debate. It has been suggested that illuminative research will remain the cornerstone of academic life and could be nurtured in higher education by the academic development units. The remaining two processes, evaluation and legitimating, need to be considered together because if you scratch the back of some evaluations you will find legitimating exercises. Being convinced that we shall see more evaluative research increases the possibility that evaluators may actually be role-playing as evaluators, caught in the political web woven by others for non-educational gain. Evaluations usually have hidden agendas. Early discussions about a possible evaluation should probe the covert reasons for it. It is not difficult to imagine an evaluation set against a back drop of a department wanting to appear open and an evaluation team seeking personal visibility or kudos. But is this evaluation or legitimation? So this is a cautionary note for consideration as the tide of evaluation rises. Some good may come from these politico-evaluations (politically motivated) and idio-evaluations (motivated by selfish reasons) but this benefit will be serendipitous.

The final decision, whether to conduct an evaluation or not, should be taken after a detailed examination of the reasons given and hidden by the requester and the evaluator. If, as the evaluator, you are still unsure then perhaps we should heed the advice of Polonius to Laertes:

> This above all: to thine own self be true,
> And it must follow, as the night the day,
> Thou canst not then be false to any man.
> (Hamlet, Act 1, Scene 3)

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General Education Within Professional Education

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ABSTRACT
The debate regarding the general education component of professional education is as unresolved as ever. This paper proposes a basis for the analysis of this question. First of all an evaluation of the needs of society, industry and the profession is undertaken and a hierarchy of needs is proposed. Against this background the basic issues which the general component of professional education should address are defined. It is argued that a sound general education is an essential ingredient in all professional courses.

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GENERAL ASPECTS OF PROFESSIONAL EDUCATION

In a little more than a century, the professions have developed from being a few relatively small elitist groups to one of the major forces in comtemporary society. Most of the professions as we know them today were founded in the mid-nineteenth century. In order to challenge the existing elites, the 'professional entrepreneurs' of the day had to establish groups that could guarantee a superior and more consistent standard of service from both a technical and ethical viewpoint (Larson, 1977). An important feature of this was the standardisation of professional education. Once the young institutions had gained social acceptance, community recognition followed through the formalisation of professional education in universities. In this environment, supported by university and other research, the cognitive base of the professions expanded rapidly. This trend has continued to the present.

In the interim, the demands placed on professional education have been extremely complex. As the growth of the modern industrial state has relied heavily on the technical abilities of professionals, education has come to be the production process for the development of human resources. Another aspect is that, as the institutional structure of society has become more and more differentiated and specialised, professional education has come to play an important role in the socialisation of professionals.

Specialisation itself is a complex development. As the field of knowledge has expanded so the projects undertaken by humanity have increased in complexity. Specialisation has provided an indispensable division of scientific labour from two viewpoints. Among professional practitioners it has increased the potential for improving 'production' efficiency. On the other hand, in research, the ability to specialise in narrow fields has increased the potential for the rapid expansion of knowledge. Galbraith (1972) believes that the success of the industrial system and consequently of the large corporations lay in 'their ability to take ordinary men, inform them narrowly and deeply and then, through appropriate organisation to put this knowledge into practice'.

However, the world does not divide neatly into the specialist regions defined by academics or industry, nor are these regions independent. Problems have arisen both in professional practice and in education because of increasing specialisation. Professionals are finding it more difficult to develop a holistic understanding of contemporary problems and their solutions. Of this Jensen in Jensen and Hake (1972) writes:

> Bourgois education — originally conceived as a means of emancipating people from societal constraints, trusting in the power of reason to enlighten — was driven into the isolation of narrow factual constraints, from which the reflection of overall structures was no longer possible. Thus increased education no longer tends to emancipate but rather leaves the individual in a state of dependency.

These sentiments are also reflected by Hake (1975):

> The weakness of the emerging carriculum is its failure to demystify knowledge and its relation to social action as well as its failure to develop the basic qualification of social criticism.

Thus we see that a complex system of education has developed to serve the many and varied demands placed on it. While some needs are satisfied, others are left wanting.

The major influence on education in modern society is exerted by the state. Jensen in Jensen and Hake (1972) writes:

> Because of the predominance of economic mechanisms for regulating society the state becomes increasingly involved in educational issues for three reasons: overall economic growth, economico-political competition between the two major political systems, and the control of social crisis. Thus the state becomes strategically the most important agent, performing its stabilisation and regulation function ..... and its interventions in the labour market, inter alia, through educational planning and scientific policy.

Against this background, this paper discusses the objectives of professional education and a model is proposed for the determination of the general education component of professional courses.

AN EVALUATION OF NEEDS

In considering the objectives of engineering education, Grayson (1975) approached the question through an evaluation of needs. Conceptually the approach is soundly based on a discussion of the needs of society, industry and the profession. However, the analysis lacks depth and the three categories of need are not defined in sufficient detail. The determination of objectives should reflect a hierarchy of needs. Without the definition of this hierarchy Grayson's model cannot be developed to its potential.

As the needs of the three groups (society, industry and the professions) are highly interdependent it is important to begin by defining each:

(a) Societal Needs: that science and technology should develop and be employed in a way that is sensitive to mankind's need for a stable and humane social and physical environment.
(b) Industrial Needs: Industry is the system of production in technological society. While fundamentally it exists to serve society, in a capitalist economy industry cannot operate if it is unable to make a profit. Industry's needs can be defined in terms of manpower requirements, both quantitative and qualitative.
(c) Professional Needs: The professional institutions should define their needs to balance industry's and society's requirements. Their needs should be in terms of the quality of education that is necessary to provide the specialist expertise required by industry tempered by an understanding of the environmental needs of mankind.

Since both the professions and industry ostensibly serve society, it is appropriate to consider first the needs of society: the needs of the other groups can then be defined within this framework.

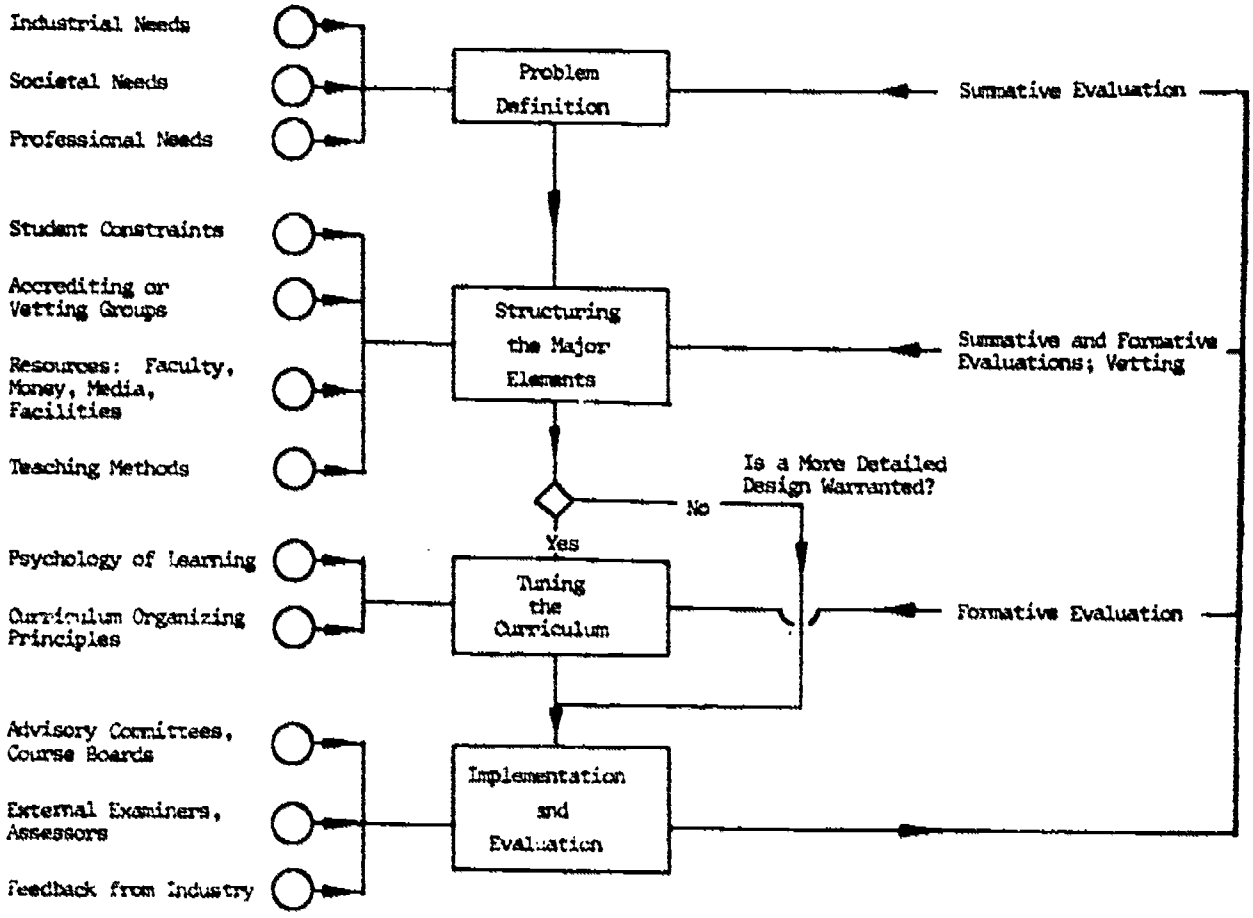

Figure 1: Representation for methodology of curriculum design (after Grayson).

SOCIETAL NEED

It has been suggested by Gravander (1976) that it is society's responsibility to define a framework of acceptable solutions and the profession's responsibility to work within these guidelines. Such a simplistic view ignores the complexity of the relationships between technology and society on the one hand the technology and the environment on the other. At present, democratic societies rely on an outmoded political system, one that was not designed for the resolution of far-reaching and complex issues in an environment of rapid change (Hooker 1981). While political decision-making is based on maintaining short-term consensus support, stable long-term goals cannot be formulated or achieved. There is an urgent need for the development of institutions that are able to formulate stable policies.

In this light, Gravander's viewpoint is very comfortable but ineffectual. Commoner (1966) discusses two solutions to the problem. If scientists or technologists directly enter the political arena in order to guide society's decisions, soon two scientists will appear as protagonists each claiming to present a scientific view. The resulting debate will injure scientific and technologi-

cal credibility. The alternative, which he supports, is that professions act as responsible groups who seriously take on the task of advising society within their area of expertise. Clearly, then, society's need is for professionals who do not see their function as simply the trusteeship of a body of learning or the practice of a discipline but rather as a commitment to serve.

INDUSTRIAL NEEDS

Grayson (1975) discusses the quantitative and technical performance of manpower planning in some detail. He suggests that the overall manpower needs of industry may be determined on the basis of evaluation and planning at the national level. Methodologies of this kind indicate overall trends and may be used to guide education policy, however several factors seriously limit the value of quantitative estimates. The delay in the system between the time a need is perceived and the graduation of new professionals is of the order of six years or more. Meanwhile, fluctuations in the national or even world economy can completely alter estimates of need in a very short period of time. Recent examples of this are the boom and bust cycles in geological exploration and resource development brought about by world market conditions. Similarly, internal economic management has caused cyclical variations in the building industry thus making it impossible to predict the employment opportunities for architects and engineers. Quantitative manpower planning at the national level can only be of value if it forms part of a consistent strategy linking all of the areas of policy and decision-making which influence the demand for professional skills. The existing policy-making institutions in Australia do not achieve this.

There is much more scope for defining industry's qualitative needs. Grayson suggests that the development of professional profiles through the analysis of existing positions is desirable. This would provide a basis for the definition of the skills, knowledge and attitudes that are needed in a particular position and these would then form an important part of the feedback mechanism for curriculum evaluation. It is important that this analysis should cover general aspects such as social and environmental responsibilities, and collaborative relationships with other professions as well as technical aspects of practice.

In the recent past, industry has found itself operating in a more difficult environment than previously. High interest rates and a fluctuating economy call for greater cost efficiency. The establishment of government departments dealing with planning and the environment and with pollution control, coupled with the increasing involvement of community action groups in decision-making, have increased the accountability of industry leaders and professionals. At the leadership level, industry's need is for senior personnel who, as well as having the necessary technical skills, have the perception and ability to avoid conflict with labour organisations, statutory authorities and the community at large. To achieve this goal often calls for informed positive action and not merely evasion. In the ranks of its professionals, industry needs technically competent people who can see that often their input is only one of a number needed for the optimisation of a solution to a larger problem. Consequently, they need to perceive their role as an interactive one in a team of professionals. In order to operate successfully in the complex environment that has been described, professionals need to see the social implications of their professional activities.

PROFESSIONAL NEEDS

The main responsibility of the professional institute is to set and uphold standards for membership which will ensure a competent service to society. Consequently, professional needs are defined in terms of ability to perform in conformity with such standards. This performance aspect is the basis of course accreditation and is the justification for demanding a certain period of post-graduate practical experience as a qualification for institute membership. In an increasing number of cases it also provides the underlying reason for the stipulation of involvement in formal continuing education programs in order to maintain currency of membership. In the past, the predominantly technical objectives that have arisen out of the need to meet industry's requirements have provided the main basis for curriculum design. This pre-occupation with technical performance has been at the expense of social and environmental aspects. The growing recognition of these broader responsibilities is timely, regardless of whether this awareness has been inspired by public criticism or arises from a concern with some of the social effects of technology. The new position demands that professional institutions be out-spoken on all issues where their expertise can help society to achieve a better understanding of problems or their solutions. It also requires that professional needs, as stated for the purpose of curriculum design, must be broadened to embrace a wider view of competence.

EDUCATIONAL OBJECTIVES

Three objectives of professional education can now be defined in general terms.

(a) To obtain a sound background knowledge of the complex social and physical environment in which we live and apply our technology.
(b) To study the technical knowledge which is necessary for the practice of a particular profession.
(c) To develop an understanding of the relationships between a particular discipline and those other fields of professional practice which must combine to solve complex problems (Symonds, 1978; Marosszeky, 1980).

The first is based on the pre-eminence of the community's need that professional practice be directed towards the development of a stable, humane environment. The second is simply a statement of the requirement for technical competence. This naturally ranks high among the needs of each group. It is a matter that receives constant attention at conferences within the professions and is outside the scope of this paper, however one observation is made. Undergraduate education, which once represented formal professional education, has now become an introduction to a lifetime of learning. One of its major aims is to provide students with learning skills and an appetite for knowledge. It is interesting to note that some engineering programs in the United States which aim at achieving this have a liberal arts component of twenty percent (Harrisberger, 1975; Cohen, 1976, 1977). The third objective is a recognition of the increasing complexity of projects: it is often necessary to work on such problems in inter-disciplinary groups.

The balance of the paper focuses on the first of these objectives: the general education component of professional education. In the analysis of needs, those of society were considered to be the most important. The obligation of industry and the professions to meet the needs of the community therefore flow from this. In addition, however, another argument can be developed to suggest that it is in

the interests of both industry and the professional groups to do so. In the past century the face of the earth, in both physical and human terms, has been re-shaped by the activities of large coroporations and the influence of professional groups. The stage has been reached where every aspect of life is influenced by the practices and attitudes of at least one profession. Clearly, both public and private corporations and professional institutions wield substantial social power. To date there has been little recognition by these groups of the need to accept social responsibility (Davis, 1979; Marosszeky, 1982), and Davis has drawn attention to a possible consequence of this: "in the long run, those who do not use power in a manner which society considers responsible will tend to lose it." This of course describes the position of universities as well. While they are powerful social institutions, threats to curtail their independence rise whenever the community questions the wisdom and responsibility with which they exercise their power. It is important that the universities develop their programs to best serve the community's interests.

GENERAL EDUCATION IN PROFESSIONAL EDUCATION

The general aspects of professional education need to be considered in terms of the first objective: to obtain a sound background knowledge of the complex social and physical environment in which we live and apply our technology. This background knowledge can be described as the study of three basic relationships:

- The relationship between the individual and society.
- The influence of technology on society.
- The influence of technology on the environment.

At present, in many institutions an attempt is made to achieve this through the inclusion of elective humanities subjects in technology courses and through teaching the history and philosophy of science (HPS) to students in liberal arts. There are two fundamental problems with this approach.

While the programs may be excellent in themselves, the 'cafeteria' mode of selecting subjects rarely, if ever , leads to the achievement of the desired objective. Further, there is usually very little in technology courses to teach students about the history and philosophy of science. Similarly, it would be unusual for a student in the humanities to learn about individual/society and technology/society relationships, even though they may have to study HPS.

It is proposed that a structured approach should be taken to teaching the matters under consideration. This structure can be derived from an analysis of the inter-relationships between the various fields of knowledge. The system of knowledge could be mapped out in very general terms as follows:

HUMANITIES	APPLIED HUMANITIES	TECHNOLOGY	APPLIED SCIENCE	SCIENCE
Philosophy	Philosophy - of science - of technology	Engineering - Civil - Electrical - Mechanical - Chemical - Electronic	Material Sciences	Mathematics
Art			Geography	Physics
Music	Physical - political - legal - commercial		Chemical Technology	Chemistry
Literature			Forestry	Biological Sciences
Drama	Social - psychology - sociology	Architecture	Agricultural Sciences	Geology
Psychology		Building	Applied Geology	Earth Sciences
Sociology	Historical - of science - of technology	Medicine	etc.	etc.
Anthropology		Town Planning		
History		Landscape Architecture		
Languages	etc.	Industrial Arts		
etc.		etc.		

Figure 2: System of Knowledge

The groups of subjects under the headings of Humanities, Applied Science, Science, and Technology are familiar to everyone, but the grouping of subjects under Applied Humanities may be controversial. It is useful to consider this group, the humanistic study of the human/technology relationship, as being counterposed to that part of applied science which is the scientific study of the technology/environment relationship. The purpose of this grouping of subjects is to define the fields of study which relate technology to the environment and to humanity.

The three relationships which should be studied by students to provide them with the necessary background knowledge can now be described in terms of this system of knowledge:

- The relationship between the individual and society draws from the areas of humanities and applied humanities. It might include study in philosophy, literature, sociology and politics.
- The influence of technology on society is drawn substantially from the applied humanities.
- The influence of technology on society is drawn substantially from the applied sciences.

These should be taught as formal coursework to all students in a university regardless of their disciplinary area of study. The criticism could, and doubtless will, be levelled that each of these areas is so vast that an entire program of full-time study could not embrace them. Doubtless this is true, however if Van Loon (1964) could encompass the history of mankind in a single volume, it should be possible to formulate subjects to teach the areas outlined. The time spent would almost certainly exceed the five or so percent that is currently dedicated to this purpose. However, time allocations need to be considered in terms of the overall objectives of a teaching institution.

As most of the argument has centred on the role of professionals in society it might well be asked, why should every university student have to undertake these studies? Graduates tend to be opinion leaders in society. As the community is becoming more involved in decision-making through direct action and as the issues to be resolved are becoming more complex it would be to the clear

advantage of the community to have university graduates who are well-informed about contemporary issues.

CONCLUSION

This paper has set out to develop a basis for the determination of the general education component in professional education. In the introduction, quotations from Jensen and Hake were used to describe the limitations of education with regard to the development of intellectually independent graduates who have the necessary skills and attitudes for social criticism and the ability to reflect on overall structures in society. Because of the greatly increased role of the professions in modern society, the paper advocates a change in emphasis in professional education. An increase in the general education component is considered necessary so that professionals can better serve the interests of the community. In addition, it is noted that unless the professions do act responsibly in the eyes of the community they could lose some of their social power.

While some argue that man needs to operate within a well-defined, constrained system and therefore may not need a broad general education, it cannot be disputed that society needs some individuals who have the ability to critically reflect on the overall structures within society and who are able to guide change. Since it is not possible to predict which individuals will develop the capacity to so influence change, let along those students who will achieve the position to do so, it is important to broaden the education of all professionals along the lines proposed. A further argument supporting this, is based on the fact that the more educated members of a society tend to be opinion leaders in the community. Any investment in improving their education is therefore justified.

Finally, it is important to reflect on the university's responsibility for curriculum development. In the introduction, the quotation from Jensen describes the state as having the major influence on education, its motives being to ensure social and political stability and overall economic growth. Since the university is responsible to the community for the education of its future leaders, in a democracy the university can and should look beyond the state's perception of its needs. The university has a social responsibility to guide education along lines that will, in the long term, best serve the community. Just as it is pointless to promote change that will not be acceptable to the existing power structures in society it is irresponsible to maintain the status quo when change is needed.

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Reviews

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Professionalism and Flexibility in Learning. D. Bligh, ed. Guildford, The Society for Research into Higher Education, 1982. ISBN 0-900868-87-2. 167 pages. Price £6.90.

Understanding Student Learning. N. Entwistle and P. Ramsden. London, Croom Helm, 1983. ISBN 0-7099-0921-7. 248 pages. Price A$27.50.

The two books reviewed in this article are quite dissimilar. The first, Professionalism and Flexibility in Learning edited by Donald Bligh is one of a series published by the Society for Research in Higher Education as part of its Leverhulme Study series. The series summarises the results of a Leverhulme Trust supported programme by the SRHE 'focussing informed opinion and recent research findings on the major strategic options likely to be available in higher education institutions and policy-making bodies in the 1980s and 1990s' (p.1). This book deals with the part of the programme focussing on teaching and learning in higher education. The second, Understanding Student Learning by Entwistle and Ramsden, summarises the results of a five year SSRC research funded project focussing on in-depth analyses of students learning methods. The Bligh book provides a broad brush outline of various aspects of teaching and learning in higher education, the Entwistle and Ramsden book summarises the results of a single programme of research into student learning. In this review I will comment briefly on each in turn and finally make some concluding comments.

The Leverhulme funded project was structured around a series of commissioned research reviews by acknowledged specialists on various aspects of teaching and learning in higher education, followed by seminars involving those with detailed knowledge and experience discussing the reviews and drawing out some preliminary policy implications. The reviews and policy implications were then published (this monograph being one such publication). Wider debate was then encouraged, policy implications were considered and a final report was produced.

The book contains five chapters. The first summarises the recommendations made by the seminar considering the commissioned reviews. These reviews are included in the subsequent chapters. The second chapter focusses on issues associated with continuing education in universities and polytechnics. The third chapter discusses ways of thinking about the curriculum, and policies which may provide for flexibility and innovation. In chapter four assessment issues in higher education are discussed, and chapter five focusses on other aspects of teaching and learning processes. This book contains well informed,

practice oriented reviews of various aspects of the teaching and learning processes in higher education and as such is likely to be of interest to specialists and non specialists alike. But one important issue seems to have been inadequately dealt with. That is the issue of coherence in students programmes of study. Goodland, Pipard and Bligh in their chapter on the curriculum in higher education argue forcefully for improving coherence and argue against courses modular in content. Their arguments seem quite convincing. But in the previous chapter Hoggart, Stephens, Taylor and Smethurst seem to have argued for modular courses, spread over several institutions, for continuing education. Nowhere in that chapter is the question of coherence discussed. This issue of coherence seems to me to be a major consideration for modular courses and one which needs considerable further discussion in the context of the proposed continuing education courses. The chapter on assessment provides a very practical overview of a number of problems in assessment. One example is that of increasing the reliability of assessment items at the expense of validity.

The final chapter on teaching and learning seems to be somewhat biased towards a discussion of teaching at the expense of learning. The chapter argues for a systems approach to the improvement of teaching, seeing the act of teaching as just one part of the system.

Each chapter contains several propositions which are designed to highlight the major points discussed in the chapter but are at times somewhat distracting, breaking the coherent development of the argument within the chapters.

The second book reports on a substantial research study, the purpose of which was to investigate students 'approaches to learning, and to determine the extent to which these reflected the effects of teaching and assessment demands rather than representing relatively stable characteristics of the individual learners' (Preface). The book includes a foreward by W.G. Perry, ten chapters, and a number of appendices. Reported are qualitative and quantitative studies of student approaches to studying and their relationship to personality and cognitive style, approaches to reading academic articles, students perceptions of and approaches to learning in contrasting departments, and a summary of the contributions of the reported research for the further understanding of teaching and learning.

The research reported in the book draws upon and develops further the work of Ference Marton, of Gordon Pask and John Biggs. The research focusses on how students learn from the point of view of the learner rather than how much the student has learnt from the viewpoint of the teacher. In summary the research points to an important relationship between how students learn and the context in which that learning takes place.

The authors aim to present their findings 'in a form which we hope will be accessible to students, lecturers, and all who have an interest in higher education' (p.4). The authors state that the book is a less technical version of the final research report of the project. Even so, there is a substantial amount of statistical information, analysis and interpretation included in the text, and while it is a very valuable book for those professionals interested in research on learning, it may still be somewhat too technical and detailed for more general readers. Nevertheless, the final chapter is a particularly good and readable summary of the research and the implications it has for policy and practice in higher education. The authors comment both critically and constructively on such matters as study skills programmes, teaching and assessment methods, course redevelopment and staff development. The implications of their work in these areas are important and informative.

In summary Bligh's book contains very practical reviews of literature in a number of areas and a set of practical recommendations based upon these reviews and subsequent discussion. Most of the chapters are quite pragmatic with little theoretical discussion. It should be of interest to researchers, practitioners and policy makers in higher education. On the other, the Entwistle and Ramsden book is based upon original research including some theoretical discussion and development which would be of interest to researchers and possibly others, with a final chapter which would certainly be of interest to both researchers and practitioners.

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Federal Intervention in Australian Education: Past, Present and Future. G. Harman and D. Smart, eds. Melbourne, Georgian House, 1982. ISBN 0-85585-505-3. 197 pages. Price $12.50.

Coordinating Australian University Development: A Study of the Australian Universities Commission, 1959-1970. A.P. Gallagher. Brisbane, University of Queensland Press, 1982. ISBN 07022-1657-7. 244 pages. Price $30.

Resources and Higher Education. A. Morris and J. Sizer, eds. Guildford, Society for Research into Higher Education, 1982. ISBN 0-900860-90-0. 266 pages. Price £7.35.

The Structure and Governance of Higher Education. M. Shattock, ed. Guildford, Society for Research into Higher Education, 1983. ISBN 0-900868-91-0. 210 pages. Price £7.35.

Each of these four publications is concerned, inter alia, with the funding role of national governments in respect to post-secondary (higher) education in Australia or the United Kingdom and the influence this funding has had on policy development both at the institutional and 'system' levels for higher education. Federal Intervention in Australian Education explores a number of key themes and issues relating to the role of the Federal Government in education from three different perspectives. First, the pattern of past intervention is mapped over the years to 1982. Second, the main forms of Federal intervention and Federal Government policy on education are considered with special reference to Prime Minister Fraser's statement of 30 April, 1981, on the recommendations of the 'Razor Gang', and the June, 1981 guidelines. The latter provided for further budgetary constraints on universities, colleges of advanced education and government schools. These Government decisions raised such questions as to whether a major change in direction in Federal intervention was signified; and, whether the Fraser Government wished to scale down its commitment to education; or, in the longer term, to withdraw entirely from the education area. The book attempts to set questions

such as these and their consequences in a broader historical, legal, financial and policy context. The third perspective - the future - is considered by reviewing options and possibilities with regard to both Federal and State Government roles in education in the years to come.

It is pointed out that the Federal Government's commitments in education were not developed as a result of any clearly enunciated, overall, long-term strategy. Nevertheless, the Federal Government has had and continues to have a major impact on Australian education. In reality, the Federal Government is an important source of influence and change in all sectors of education - pre-schools, schools (including the non-government sector) and post-secondary institutions.

Although the role which the Federal Government will play in education in the future is unclear, there is agreement by contributors to the book, that the present arrangements of shared responsibility for education between Federal and State Governments are not satisfactory. According to Harman:

> The most sensible solution seems to be to seek a more rational allocation of roles and responsibilities among Commonwealth and State Governments on education, and to work to achieve a more co-operative, joint Federal-State approach to educational needs and problems. (p.179)

Coordinating Australian University Development is a case study of the role of the Australian Universities Commission (AUC) in public policy-making from 1959 to 1970. Gallagher's central theme is that

> in playing its part in university development during that period, the AUC increasingly served the Commonwealth Government rather than universities or State Governments, thereby facilitating a growing national role in an area traditionally the responsibility of the States. (p.1)

In support of this contention, he discusses the ways in which successive ministers influenced the operations of the AUC by establishing an atmosphere in which the Chairman of the AUC was in no doubt of political guidelines and constraints. Major changes in the coordinating activities of the AUC during the period are examined against the tensions and interaction of (i) national and States' rights; (ii) university autonomy, that is, the differences between the plans of the individual universities and the AUC's perceptions of national and individual university needs; (iii) statutory independence of the AUC and the requirement of the Commonwealth Government and Commonwealth Departments to coordinate the overall development of the Commonwealth's role in education; and, (iv) the AUC's dual function to provide advice to the Commonwealth Government and to regulate programs which resulted from that advice.

In his analysis, Gallagher considers the effect of changes in general economic and social conditions on altering the role of the AUC. Through the AUC the Commonwealth Government exercised a financial control which allowed it to become the dominant influence in the growth of universities. Through the implementation of many of the recommendations of the Martin Report (1959) the AUC played an important role in channelling the direction of tertiary education. In the evolution of a 'tertiary system' of education, the AUC acted as a catalyst, increasing centralized control. The AUC successfully co-ordinated the national level planning of universities adapting its role to allow for the interacting adjustment of political, bureaucratic, academic and market forces. Although "such elements as uncertainty and muddle are a conspicuous characteristic of the process of coordination" (p.205), Gallagher's

research establishes that the AUC became the "single most important influence" in the future of the university 'system', through

> the generation of rules and common principles concerning bids by universities for financial assistance, by regulating new developments, and by the control of growth patterns. (p.215)

Resources and Higher Education is the eighth publication of the SRHE Leverhulme Programme of study into the Future of Higher Education in the United Kingdom. The book is the product of a specialist seminar on resources and their allocation in higher education, which focussed informed opinion and recent research findings on the major strategic options likely to be available to higher education institutions and policy-making bodies in the 1980s and 1990s.

The seminar favoured an approach to planning and resource allocation under conditions of contraction, financial stringency and changing needs. This approach required a 'top down' Department of Education and Science (DES), Universities Grants Committee (UGC) and National Advisory Body for Local Authority Higher Education (NAB) statement of policies, objectives and guidelines; 'bottom up' responses from institutions; advice to the Secretary of State and the UGC. Once they had agreed plans with their funding bodies, it was considered that institutions should have to ensure that their resource allocation procedures were consistent with their plans and with department mission statements. Institutions which reject market mechanisms in favour of the UGC 'core' model should be prepared to support the UGC and NAB through difficult times. For their part, Ministers and senior DES officials should ensure that they provide the policy guidance and appropriate time framework to allow both the NAB and the UGC, or any future trans-binary body, to undertake their task within the spirit of the 'top down, bottom up, top down model'.

According to seminar participants a

> fundamental question facing higher education is the extent to which consensual arrangements and assumptions that generally worked well during the long post-war period of expansion can cope with the much more stringent conditions likely to prevail in the 1980s and 1990s. (p.1)

A problem posed but left ananswered, which is significant also to the Australian higher education scene, is whether there is

> sufficient common purpose amongst the various institutions and interest groups that constitute the 'higher education system' to permit the development of viable long-run policy objectives, or must higher education policy increasingly become merely the outcome of a struggle for survival and dominance among conflicting interests and ideas? (p.1)

The Structure and Governance of Higher Education is the ninth publication in the SRHE Leverhulme Programme and arises from a specialist seminar which considered the future relationship between the national government and the various institutions of higher education for which the government will remain the chief paymaster.

> Governance relates to the attempt collectively to cope with the diversity of academic institutions and disciplines in higher education ... to steer, just a little, the many ways, most of them unplanned, by

> which the system elaborates itself, thereby exhibiting flexibility in settings of growing uncertainty. (p.41)

At a late stage in the proceedings, the seminar concentrated on the "traditional call for institutional autonomy" which was not unexpected following the criticisms levelled by participants at the failure of departments of education, under successive governments to work out positive and comprehensive policies for higher education. The day-to-day, piecemeal reacting to events of so-called departmental long-term higher education policy-making, was criticised as being inadequate to meet national needs. It was proposed, therefore, that the UGC should become more independent of the Department of Education and Science; that the UGC and NAB should publish their advice to the government as well as the criteria they use to make judgements (including financial) between institutions. Rather than accept the idea of a long-term merger between the UGC and NAB, the majority of seminar members recommended the establishment of a Higher Education Policy Studies Centre to carry out a continuous long-term exploration of policies and policy options in higher education. The Centre would 'overarch' both the UGC and NAB without interfering with the established powers and functions of either, despite the proposal that it should "offer strategic advice to the Secretary of State on matters relating to higher education including the division of funding".

A number of seminar sessions recorded the unrealistic view that the future of higher education and the institutions that compose it should be left to market forces and "natural demand". Such a view ignores the fact that places in higher education are already affected by the government's determination of the level of student grants and supplementary student loans.

Although the "binary line" was perceived as a hindrance to obtaining agreement on the commonality of issues which face higher education, seminar participants were unable to generate positive ideas for a new structure. The stratification of institutions appears to be entrenched in higher education in the United Kingdom and will probably remain so for some time to come, as indeed is the case in Australia. These four publications make a valuable contribution to policy studies in education. By reading them consecutively one is struck by the similarity of problems faced by the national governments in Australia and the United Kingdom with respect to the funding and regulating of institutions of higher education; the loss by these institutions of their independence and autonomy with respect to their development; and uncertainty as to the future of existing higher education institutions in a climate of increasing financial constraints on government spending.

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Chairing the Academic Department – Leadership among Peers. Allan Tucker. Washington, D.C., American Council on Education, 1981. ISBN 0-8268-1424-4. 307 pages. Price £17.30.

It is unusual for a publication addressing administrative topics in United States universities and colleges to be seen as relevant in Australia. It is also unusual for a book to serve with success a number of objectives and a diversity of readers. Tucker's book ranks high on these counts. The author, who had been academic vice-chancellor of the Florida State University System and subsequently a professor of higher education, had a concern for the difficulties faced by heads of academic departments who came to their position, often with much teaching and research experience, but with little if any preparation for administrative work. Nor were there opportunities for training or sources of support for them. With a grant from the Kellogg Foundation he set out to "design and test a model for enhancing the planning, management and leadership competencies of departmental chairpersons". From the field studies associated with this project Tucker and his team defined the primary issues confronting departments.

Each of the fourteen chapters of the book identifies a set of issues and follows a more or less common format by outlining the topic, identifying the normal departmental responses, referring to the field findings, and exploring the issues in the light of these along with the writer's experiences and his knowledge of organization theories. Each chapter then concludes with a list of questions designed to provide a self analysis framework for the departmental head reader. A set of pertinent references completes each chapter. If this sounds somewhat mechanical the fault lies with the reviewer's presentation, not the author's, since Tucker's style is consistently interesting.

Most chapters have a surprisingly high applicability to Australian institutions dealing as they do with the roles, powers and responsibilities of chairpersons, types of departments, leadership styles, delegation, departmental committees, decision making, bringing about change, handling conflict and maintaining morale. Other chapters, if not concerned with what might be termed the present state of the art in Australia, point to emerging issues likely to have an early impact. Thus, not all heads of departments are ready for academic staff evaluation a task aptly described by Tucker as the one "which dares not show its face". Performance counselling and the management of resources be they time, people or money also fit into this category. One or two chapters have little close applicability, as for example, that on faculty grievances and unions, yet even here, because of the changing industrial and social legislation scene, there are vicarious lessons to be learnt.

The book thus provides a wealth of information for the new or established head of department or dean whatever that person's current style may be - country club spectator, technician, jungle fighter, gamesman or crisis manager. It also provides a valuable compendium of information for the student of higher education. The processes described do not necessarily conform with Australian practice but the issues are lively and relevant. Tucker, originally a Canadian educated at the University of Toronto and subsequently at Michigan and London, played a major role in the establishment of the newer Universities in the Florida State system. This breadth of experience has enabled him to transcend the boundaries of culture and nation orientation

to provide a book with wide acceptability.

An outcome of some importance has been the use of the material for training purposes. The American Council on Education used the book as the basic material for its leadership program in more than thirteen state university systems. Professor Ronald Baker, Head of the Institute for Departmental Leadership bought the copyright for Canada and, with slight modification has used the material with considerable success at numerous workshops in that country. This year the Institute for Higher Education brought Professor Baker to Australia and the materials were modified for Australian conditions. A workshop convened by the Institute, evoked very supportive responses from the participants. Individual institutions have since used the material at do-it-yourself one or two day workshops. The reviewer believes that these activities would be enhanced if one or two outside catalysts or facilators were present.

This book is not likely to become a definitive work or a classic text. It can best be described as being immediately useful, handy, easy to read and practical. It might profitably be left lying in places frequented by vice chancellors and principals, and promotions and selection committees as well as at the bedsides of heads of departments, fledgling or experienced.

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From Clergyman to Don: The Rise of the Academic Profession in Nineteenth-Century Oxford. A.J. Engel. Oxford, Oxford University Press, 1983.
ISBN 0-19-822606-3. 302 pages. Price £22.50.

Traditionally, publication in the field of university history has been monopolised by generally dreary tomes offering "blow by blow" accounts of the development and fortunes of particular institutions. In recent years, however, some writers on university history have focussed attention on various aspects of the development of the idea of a modern university during the nineteenth century (Rothblatt, 1968; McClelland, 1980; Fallon, 1980), and in relation to Oxford, A.J. Engel's From Clergyman to Don is a significant contribution to a growing literature in this important area of historical/educational inquiry.

Engel's work is a study of how teaching in Oxford was transformed in the nineteenth century from a temporary occupation for young clergymen into a separate, essentially secular profession, and of the effects which this transformation had on the role of the University in society. It shows that central to the intellectual conflicts and institutional changes in nineteenth century Oxford, was the question whether the University ought to provide a career for academics, and, if so, what sort of career it should be in terms

of functions, status and duties; and, most importantly perhaps, it demonstrates that the answers to these questions have largely determined the shape of modern Oxford.

Engel cites evidence given by numerous Oxford men to the University Commission of 1850-52 and to the related inquiry by the Hebdomadal Board, together with reports of the Tutors' Association (formed to articulate tutorial views on University reform and the Commissioners' recommendations) to demonstrate that a remarkably consistent ideal of an academic profession had emerged among the dons in the mid-nineteenth century. Moreover, unlike ideals of academic life which had been formulated in the period prior to the Commission, and which were further promoted by the Commissioners' report, this new ideal was a distinctly Oxford product. It was forged to meet Oxford conditions and to fit the aspirations of Oxford dons: its goal was to expand the possibilities of careers in the University while altering the system of collegiate autonomy and the traditional concept of Oxford education as little as possible.

From Clergyman to Don traces the highly complex attempts of the college tutors to achieve this goal from the time of the Oxford Act of 1854 and the Executive Commission of 1854-58 to the outbreak of the First World War. Fundamental to their ultimate success, the author argues, was the Act of 1854. It drastically reduced the power of the heads of houses, yet averted the domination of Oxford by the professoriate, and so correspondingly enhanced the influence of the tutors, who increasingly came to desire the acceptance of academic work as a life-career and recognised profession. At the same time the growth in power and importance of the tutors, especially in the colleges, tended to intensify their commitment to collegiate and tutorial ideals. In the college system, moreover, the tutors found sufficient flexibility to satisfy certain of their aspirations left untouched by the Executive Commission of 1854-58. Opportunities for specialised teaching, for instance, could be provided through the combination system, without abandoning the primacy of collegiate organisation, and hence, while educational methods and ideals, concerned with teaching, examining and curricula, were modified in nineteenth century Oxford, their basic collegiate orientation was preserved.

College loyalties were further strengthened in the second half of the nineteenth century, the thesis continues, by the changing position of the tutors in University government. While their previously weak position in Congregation had been improved by the Act of 1854, a proliferation of non-academic voters in the 1860's and 1870's meant that the tutors were more certain of their power in their own colleges than they could be in the University. (The fact that this situation remained in effect until after World War I was a potent source of tutorial distrust of University power.) Additionally, the college loyalties of academics were strengthened when the agricultural depression of the late nineteenth century (and continuing into the twentieth century), nullified the financial predictions of the Cleveland Commission of 1871, on the basis of which the University Commission of 1877 recommended the allocation of large sums from college endowment income for the support of science and the professoriate. In the struggles for the resources remaining, after taking account of the greatly reduced income caused by the depression, 'University purposes' were inexorably placed in opposition to the interests of the colleges; and college tutors, especially the younger ones, were confirmed in their antipathy toward science and the University professoriate.

By 1914, Engel concludes, the goal projected by the tutors of the mid-nineteenth century had, in its broad outlines, been achieved; and the enduring shape of the new academic profession had essentially been completed. At the same time, the collegiate orientation of the majority of the dons proved

to be the source of both the outstanding strengths and weaknesses of the academic profession in Oxford. On the one hand, the personal and intellectual independence of the don was carefully protected from the encroachments of administrators or senior professors. On the other, their loyalty to the collegiate system resulted in the failure of the dons to achieve the full and satisfactory career pattern for which they had struggled: for instance, the emphasis of the college system on the paramount importance of tutorial work, and its acceptance of an exclusively 'disciplinary' theory of liberal education tended to make it difficult for the recognition of advanced study and research as important parts of their academic work; the perennial suspicion of the colleges for the University and the effects of both the agricultural depression of the late nineteenth century and the inflation of the First World War period combined, furthermore, to rob Oxford dons of the full fruits of their long struggle to achieve their goals. None the less, the compromise accepted by the dons of the early twentieth century has proved remarkably enduring. Although government commissions since World War I have altered the relation of the University to the state, to the colleges, and to the British system of higher education as a whole, the ideals and institutions of the academic profession which had taken shape in Oxford by 1914 became the firmly established traditions which all further reforms have been unable to do more than mildly modify.

From Clergyman to Don will be of particular interest not only to scholars concerned with the historical forces which have shaped the academic ideals and the pattern of organisation of modern Oxford, but also to a wider cross-section of teachers and administrators in higher education who wish to enhance their understanding of the idea of the university in society. It presents a highly complex and most important thesis in a scholarly and thoroughly documented, but, at the same time, concise and simple style.

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Economies of Scale in Higher Education. S. Goodlad, ed. Guildford, Society for Research into Higher Education, 1983. ISBN 0-946376-00X. 100 pages. £12.00.

Practice and Perspective in Validation. C.H. Church, ed. Guildford, Society for Research into Higher Education, 1983. ISBN 0-900868-94-5. 191 pages. £9.75.

What a shame that Economies of Scale in Higher Education was not available before the recent Australian amalgamations occurred. Our amalgamations were politically imposed because, it was claimed, they would produce economic and administrative efficiencies. As with most political decisions, questions of staff and student morale, academic standards and practical inconvenience, did not predominate.

What this book shows is that large higher education institutions may be less effective than small ones in stimulating the morale and motivation of students. For example, a smaller proportion of students in larger institutions participate in activities than do students in smaller institutions; and students of marginal ability are frequently neglected.

The book is the outcome of a conference jointly sponsored by the U.K. Higher Education Foundation and the Department of Education and Science. Its nine sections deal with topics such as the effects of mergers, the problems of scale, and cost benefit analysis. The chapter on student development is especially persuasive, showing that large units in industry and business -

(a) are not necessarily more economic;
(b) are usually less efficient;
(c) have a worse record for innovation;
(d) provide higher price goods and services;
(e) are less profitable, or no more profitable, than small units.

The chapter on scale argues strongly for higher education institutions of between 1,500 and 4,000 students. Whilst we certainly won't turn back the clock in Australia, let us at the very least learn from others, but especially from their mistakes. Alas! Few political decision-makers seem to read research reports such as this one.

Practice and Perspective in Validation deals with the approaches to course evaluation in the U.K., including the activities of the Council for National Academic Awards (CNAA), the universities and the professions. Even though the Australian approaches to course validation are different to those adopted in the U.K., much of the discussion and information in the book is still of interest and relevance to our academics and to administrators of co-ordinating bodies.

There are two validation extremes, both of which are to be avoided. One extreme is for the institution to mount courses with no more validation than the uncritical approval of an academic board based on a brief course description included in a committee report. (In my experience, the shortest description was three lines!) The other extreme is what we presently have in some C.A.E.'s,

which have given birth to gigantic internal and external course accreditation monsters which grow fat feeding on huge mounds of paper covered in behavioural objectives. Both extremes could learn from this book, which validates validation.

A further area of interest to those of us in Australia is the discussion of the issues posed by professional control in areas like architecture, dentistry and medicare. As the book points out: 'When the chips are down it is, of course, the professional bodies who have the upper hand' (p.19).

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Qualitative Data Analysis for Educational Research. J. Bliss, M. Monk and J. Ogborn. London, Croom Helm, 1983. ISBN 0-7099-0698-6. 215 pages. Price $27.50.

The blinds are drawn because of the sun,
And the boys and the room in a colourless gloom
Of underwater float: bright ripples run
Across the walls as the blinds are blown
To let the sunlight in; and I,
As I sit on the shores of the class, alone,
Watch the boys in their summer blouses
As they write, their round heads busily bowed:
And one after another rouses
His face to look at me,
To ponder very quietly,
As seeing, he does not see.

from The Best of School,
D.H. Lawrence

At a first glance it may seem somewhat curious to begin a critique of an educational research text with a stanza from a poem. But consider, for a moment, Lawrence's writing as a piece of data, a record of a moment in the classroom. As such it would constitute a description which is essentially qualitative. Which brings me to the first problem I had in exploring Qualitative Data Analysis for Educational Research by Bliss, Monk & Ogborn. For the authors have invested in the title a peculiarly confining notion of qualitative data, in that the contents of the book addresses itself exclusively to the analysis of interview protocols.

Qualitative data does not deserve to be so narrowly defined. It includes, among other things, descriptions of settings, portrayals of people, samples

of work, and anecdotal records. For example Brauner's (1969) classic account of the presession workshop for students entering architecture at the University of British Columbia is a narration in the genre of literary non-fiction, clearly qualitative in nature but incorporating no data which would fall within the purview of Bliss et al's definition. Furthermore even within the interviewing process itself there is some concern about the relative merits of the various means for recording the interview. MacDonald & Sanger (1982) discuss at length the generating, processing and reporting of interview data where the key variable is the recording technique, audio-tape recording versus note taking. Bliss et al. have organised their argument around the former practice which provides a faithful account of the protagonists' interactions, but at some cost. They have not acknowledged that other means of recording are available and that they too carry benefits.

Recognising that the title is somewhat misleading what then is the function of the book? Basically it is the provision of a form of notation for systematically setting down networks which account for the information contained in interview protocols. The authors see the approach as falling between two procedures for representing such data. The one being a simple category system, the other being the putting before the reader selective quotations which are said to capture the essential flavour of the data.
It is difficult in a few brief paragraphs to explicate the complexity of the process which Bliss et al. have evolved. Networks seek to sort and categorise data with ever increasing delicacy. The process owes much to the formal study of linguistics within the school of systematic linguistics (which holds that meaning in language derives from selection in context). The notation system, so developed, seeks to portray the interdependencies between the various named categories. A logical system of distinctiveness has been developed by the authors with account being taken of: exclusive selection; co-selection and repeated selection of data. The allowed combinations of terms for any given network are called the paradigms of the network. The substance of the book lies in the third chapter in which nine cases of application are to be found. These range from dealing with tertiary students' reactions to learning, to setting down one twelve year old girl's knowledge of maths processes. The maths example is particularly interesting in that the writer discusses two versions of the network and explains why the later version proved to be the more helpful of the two. More importantly she is able to say in the conclusion what it was that had made the exercise worthwhile:

> Inevitably Karen's knowledge was incomplete or ill-defined in places... To be able to write any description of this precarious knowledge, embeded in 70 pages of transcript, seemed like quite a task. The aim had been to see if a network, a well defined system, could cope with the ill defined character of Karen's knowledge...The network revealed that there was a structure in Karen's world of mathematics that had not been obvious in other attempts at representing her knowledge... (p. 71)

While most of the remaining examples are useful they pay scant attention to the rationale for having devised a network in the first place. Indeed it is the weakness of this argument which is the book's most vulnerable feature. The argument justifying the use of networks seems to run thus:

i) That by decomposing that which is complex we may gain insights into the nature of the complexity:

> The advantage that networks offer here is simply to attack some of the difficulties bit by bit, because the power of a network to handle complexity means that not all complexities need to be dealt with at

once. (p. 198)

ii) That by representing the complex through a series of visible relationships, we will come to better assimilate the constitution of the phenomenon being examined:

> Networks can be seen as an aid in helping display categories and their connections, able to be used to communicate ideas in a compact and succinct way... (p. 115)

and

iii) That by subjecting the data to network analysis a more general explanation may emerge:

> ...to use a network involves mainly holding that the data can and should be describable from some point of view in terms more general and less particular than the data itself. (p. 184)

All this avoids the serious debate regarding hermeneutics which poses the dilemma of understanding the text in terms of both its parts and its whole. It has been argued that a meaningful interpretation of the sort of data in which Bliss et al. have an interest requires a constant juxtaposition of the parts against the whole. Smith (1983) proposes a point of view that says understanding cannot be pursued in the absence of context, that account must always be taken of the fact that meaning is both historically and socially bounded. This is not to say that there is not a place for discrete analysis, but what is disturbing is that the debate is not dealt with.

An additional problem lies in the matter of validation. On what basis may we judge a network to be a valid analysis? Some reference is made to questions of reliability and validity (c.f. p. 189 & pp. 193-194) but the application of these two tests is perhaps not sufficiently considered. This omission is particularly problematic as it is not uncommon to charge research based upon qualititative data as being altogether too idiosyncratic, quirky and impressionistic (see Phillips, 1984, for a wonderfully witty account of this view) to be of use in building and applying educational theory.

Rather, in the matter of judgement, Bliss et al. address themselves to the means of diagnosing and improving networks. Two fundamental tools are available to the network builder, instantiation and representation. The former checks for the possible instances of all paradigms that the network proposes i.e. are there any paradigms that have no instances? (Social interactions between one person is offered as an example.) The latter tests whether there are items of data which are not given adequate descriptions by the network i.e. are there items which are not represented sufficiently, or at all, by one of the existing paradigms? The network developer progressively refines the paradigms by applying these two tests. Bliss et al. are as meticulous in the setting out of these procedures as they are careful in laying before the reader a sequence of steps which will enable a network to be developed.

Indeed the book is a worthwhile acquisition in terms of fulfilling "how to" needs by providing both examples and exercises. It may finally need another volume to explain "why".

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The Role of Postgraduates in Australian Research. Margaret Powles. Melbourne, Council of Australian Postgraduate Associations, 1984. ISBN 0-9593497-9-0, 145 pages. No price given.

That the Council of Australian Postgraduate Associations recommends increased financial support for postgraduate research students is not likely to surprise anyone. The cynical could say that the recommendations preceded the report. However, the value of Dr. Margaret Powles' report is in its documentation of "the origins of research workers, the nature of their work, their contribution to the university research effort, factors which detract from their productivity and their eventual destinations in all sectors of the Australian economy." (p1) The Murray (1957) and Martin (1964) Reports, the Williams Inquiry into Education and Training (1979) and Universities Commission reports all predicate their positions on an assumption of the importance of postgraduate research, but neither they nor the recent Hill-Johnston evaluation of the Commonwealth Postgraduate Award Scheme demonstrate that importance. The CAPA report attempts to quantify postgraduate contributions to research in the universities and to the nation's research effort, estimating a 40-50% contribution to the former and 12-15% to the latter. The measures employed were publications by postgraduates as joint or sole authors, postgraduate participation in ongoing research projects, time spent on research by postgraduates, postgraduate perceptions of their contribution to departmental output, and more qualitatively, the views of the academic community. None of these measures can give an accurate figure, but the consistency of the estimates add up to a persuasive argument in favour of the ranges stated above.

The report also adds to the documentation of declining support for research and for higher education in Australia. While the universities are shouldering an increasing proportion of the nation's research burden and are the sole source of labourpower for research in all sectors - private, government, or

university - support of all kinds is declining. The figures are depressingly well-known. What may be less well-known is that the CPA stipend has declined in value from 70% of a tutor's salary to 41%, or that single students have a shortfall of $66/week behind basic living costs, or that married students' allowances are close to the poverty line. Also it is important to remember that 75% of postgraduates are now self-supporting. This information is coupled with data on the increasing average age of postgraduates, declining enrolments, poor rates of progress, high drop-out rates, etc. Logic alone should persuade policy-makers that increased support for individual students and for research projects will ease the pressures that must distract students from their demanding tasks as researchers; a compilation of data and argument such as this report may be harder to ignore than simple logic has been.

Some statements in this report require further consideration and argument. That part-time study is less effective than full-time is all but received truth in discussions of postgraduate issues, but there is some evidence in University of New South Wales and Macquarie University studies that part-time research is completed with only slightly longer enrolments than full-time. In addition, while arguing that full-time is better than part-time, Hill and Johnston offer evidence of better employment prospects for part-timers. Certainly the evidence is that part-time students suffer isolation and conflicting demands on their time and that they may feel second-class citizens in terms of attention from supervisors and departments and access to facilities. However, there is evidence that full-time students have similar problems. It seems that these difficulties may be an argument for better supervision and management of students rather than for encouraging full-time enrolments and expecting such problems to be solved.

Finally, one notes again the prevalence of arguments for increased support which are based on economic benefits to the nation. Authors of most reports mentioned above and The Role of Postgraduates in Australian Research stress the need for maintaining a balance between research in sciences, social sciences, and humanities. But the humanities always seem to be mentioned last and with some embarrassment about the benefits which may accrue from study of literature, philosophy, etc. CAPA should call special attention to those sections of the report which stress the dangers that outside funding, subtle pressures on ARGS awards, and so on, may lead to imbalance between disciplines and an over-emphasis on applied research as opposed to basic research.

Powles' report for CAPA is a valuable contribution to discussion of policy on research funding in Australia. Should warnings here and elsewhere not be heeded, the rate of exodus of graduates to overseas universities will continue to increase from the 30% of doctorates and 17% of masters graduates in 1982.

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Browsings

Oscar Wilde once said: "To be intelligible is to be found out." Since George Orwell, in his 1946 essay on "Politics and the English language", drew attention to the ways in which politicians have abused the language in order to bamboozle the public, the assault on meaning has gathered momentum. The extent of the damage which has resulted is displayed in K. Hudson's The Dictionary of Even More Diseased English, (Macmillan, 1983). Even The Times has permitted a simple piece of soap to become "a basic cleansing bar." This is a very funny book but one with a serious purpose: to alert us to language which is "used with so serious a lack of precision that it ceases to be an effective means of communication and serves only to confuse or mislead." S. Hilgartner et al. in their book Nukespeak (Penguin, 1983) indicate the extent to which atrocities can be concealed by euphemisms. A nuclear war becomes a nuclear exchange, and India described its nuclear bomb as a "peaceful nuclear device."

One of the worst offenders has been the American military establishment. A classic example was provided by Admiral Wesley L. McDonald in October 1983 when he said: "We were not micromanaging Grenada intelligencewise until about that time frame." This prompted Bruce Felkner, in a recent issue of Simply Stated (a useful newsletter obtainable from the Document Design Centre, 1055 Thomas Jefferson Street, NW, Washington, DC 20007) to translate some famous utterances of earlier admirals, who understood English, into the nonsense currently fashionable in the Pentagon.

The field which a journal covers is sometimes difficult to identify from its title. For example, what might one expect to find in the pages of The Wormrunners Digest? And what about Sabretache? Is that the professional journal for military barbers? In fact, it is the journal of the Military Historical Society of Australia. Vital Speeches of the Day, now in its fiftieth year, re-prints "the best thoughts of the best minds on current national (USA) problems." A recent issue included Carl Henry's "The crisis of modern learning: God in the university classroom" which referred to a meeting of the Association of American University Professors, held shortly after Watergate, at which a resolution was proposed condemning political amorality. This was withdrawn when it was pointed out that all the major Watergate figures were graduates of universities whose faculties were affiliated with the AAUP. Our own favourite journal title remains The Public Works and Muckshifters Digest.

The first computer was constructed in 1949 by von Neumann, a development made possible by the earlier theoretical work of the immensely gifted Cambridge mathematician Alan Turing. He had proved, following Godel's theorem, that there is no algorithm which could determine whether any proposition is provable. During the war he helped to break the Enigma cipher system but after it he unfortunately fell foul of the Manchester police and Britain's antiquated laws relating to homosexuality. He committed suicide in 1954. A fascinating account of his life and work has been provided by A. Hodges in Alan Turing: the Enigma, (Simon and Schuster, 1983). One of the best accounts of artificial intelligence, how computers work, and the social implications of their development, is the recent book by J.D. Bolter, Turing's Man: Western Culture in the Computer Age, (University of North Carolina Press, 1984). Information technology has produced more than its share of acronyms and a guide to the meaning of 10,000 of these may be found in M. Gordon et

al., Dictionary of New Information Technology Acronyms, (Kogan Page, 1984). This proved unhelpful, however, in interpreting a headline in The Pacific Islands Monthly which read: "SEMU HINTS AT COMMS." This turned out to mean that Mr Semu, finance minister of Western Samoa, had said that if they could not get funds from Australia to help establish a university then they might seek help from Russia.

Before the advent of computers there had always been a small number of people with exceptional calculating powers. In the January 1984 issue of The Cambridge Review, B. Bollobas gives an account of some Cambridge mathematicians, including Ramanujan who was born in India in 1887. With little formal education he worked unaided until he was 27 when Professor Hardy invited him to Cambridge. He was elected FRS but died aged 33. He possessed quite remarkable algebraic insight. When Hardy visited him in hospital he reported that he had travelled in a taxi with a very boring number, namely, 1729. "No," said Ramanujan, "it is a very interesting number; it is the smallest number expressible as a sum of two cubes in two different ways: 12 cubed plus 1 cubed and 10 cubed plus 9 cubed." The same article also mentions Arthur Cayley, the author of 967 papers, who was so prolific that he sometimes forgot that he had already published a particular result and submitted it again to the same journal. S.B. Smith's The Great Mental Calculators (Columbia University Press, 1984), reports many astonishing feats. Hans Eberstark, for example, memorized pi to more than 10,000 places. A.C. Aitkin, of the University of Edinburgh, probably the greatest mental calculator, who was also a professional mathematician, of recent times, claimed that his own abilities declined when he bought his first desk calculator in 1954. He went on: "Mental calculators, then, may, like the Tasmanian ... be doomed to extinction."

This year the University of Cambridge Press celebrates 400 years of operation. The oldest press in the world began work in 1584 having received Letters Patent from Henry VIII in 1534, only 80 years after the invention of printing. It has published Joseph Needham's monumental Science and Civilisation in China among many other major contributions to scholarship. This has involved the transliteration of texts in Arabic, Japanese, Korean and Vietnamese -- to say nothing of Chinese. This posed massive problems for the printers when they used hot metal type, but these have been greatly reduced by the introduction of modern typesetting technology which has made it possible to do in days what formerly took months. For details of the ingenious labours involved in this see The Cambridge Review, No. 2280, 1984.

The University of Oxford has just begun publication of an eight volume history of the University with the appearance of The Early Oxford Schools edited by J.I. Catto. At the other side of the time frame, as Admiral McDonald might have it, is the emergence of U3A, the University of the Third Age. This consists of a network of older people who have formed learning co-operatives for study purposes which have few connections with existing institutions. Accounts of this movement may be found in The Universities Quarterly, 38(1), 1983/4. Older readers may recall the Free Universities which were founded in the late sixties for young people disenchanted with the organisational structures of existing institutions. Perhaps U3A will succeed in an era where grey power will prove rather more enduring than flower power.

As this issue indicates, there is a growing interest in postgraduate education. A recent history by R. Simpson (How the Ph.D. came to Britain, Society for Research into Higher Education, 1983) says little about higher degrees prior to the 19th century. Samuel Johnson, who left university after his first year like many more recent students, was unsuccessful in his later

requests to Oxford University to confer a degree upon him. Eventually, after the publication of the dictionary, he was awarded a doctorate by, I am pleased to say, the University of Dublin. According to Mrs Piozzi (the former Mrs Thrales), he hated what he called unprofitable chat: "to a gentleman who had disserted some time about the natural history of the mouse (he said) 'I wonder what such a one would have said if he had ever had the luck to see a lion!'"

Humour tends to be in rather short supply among educators. A novel explanation for this is offered by Peter Baker in Bulletin Number 6 of the Classroom Action Research Network. After noticing the fact that most teachers do not read the results of educational research he says: "It is perhaps not insignificant that one of the funniest men I've met in education, a man who could clarify a problem with wit and could encapsulate sound educational advice in parody, was completely drained of all his humour after completing his M.Ed. and hasn't uttered a funny line since." Perhaps a notice of warning should be hung over the portals of all postgraduate seminar rooms? It seems appropriate to mention here a paper by D. Crase, "The making of a death educator" in Essence, 5, 219-226, 1982.

We must conclude with an apology to Dr Sung-Mook Hong for mis-spelling his name in the last issue and for our inability to get "Tertary" correct, despite its familiarity. Authors are solely responsible for what appears in the text but the title page of each paper is re-set by the publisher and the editor is responsible for any errors. There was a myth that The Times used to pay a shilling to any reader who sent in a cutting containing a misprint. The most famous literal in those august pages appeared in a report of Queen Victoria opening the Menai Bridge, in which, instead of "the Queen then passed over the bridge", she was reported as doing something which, although common to all humanity, is not commonly reported of royal personages.

HERDSA PUBLICATIONS

D.J. Boud, J.G. Dunn, T. Kennedy and M.G. Walker (1978), *Laboratory Teaching in Tertiary Science — A Review of Some Recent Developments.* ISBN 0-909528-08X, 108 pp.

This review surveys the developments which have taken place internationally over the period 1970 to 1977 in laboratory teaching in undergraduate courses in physics, chemistry and biology.

Eight major types of teaching methods employed in laboratories have been identified, the principal innovative features of each approach have been analysed, and the reported advantages and disadvantages have been noted.

$10.00 ($5.00 for HERDSA members)

Miller, A.H. and Ogilvie, J.F. (Editors) (1981) *Bringing Computers into College and University Teaching.* ISBN 909528-15-2, pp. iv + 74.

Papers presented at a one-day HERDSA symposium at the Australian National University in November 1980. Contributions review recent developments in hardware production and attitudes toward CAL, and report applications in the teaching of a wide range of subjects. A 105-item bibliography provides a guide to the recent literature on CAL.

$6.00 ($4.00 for HERDSA members)

Genn, J.M. *The Pursuit of Excellence in University Teaching in Australia*, 1982, pp. v + 266. ISBN 909-528-70-5,

Based upon a questionnaire survey of 800 teaching staff in six universities this study is an important contribution to the literature on the academic profession in Australia. The main focus is upon the teaching role of academics and the data are used as a basis for discussions of such issues as teaching versus research, staff-student relations, the evaluation of teaching, academic freedom, and the morale and aspirations of academics.

$30.00 ($25.00 for HERDSA members)

THE SERIES: *Research and Development in Higher Education*, ISSN 0155-6223. Published annually, each issue is the edited collection of papers presented at the Society's Annual National Conference.

Miller, A.H. (Editor) (1980) **Volume 3.** ISBN 909528-62-4, 250 pp. Papers presented at the sixth annual conference held in Canberra in May 1980.

The conference theme was "Freedom and Control in Higher Education".

$14.00 ($7.00 for HERDSA members)

Wellard, R. (Editor) (1981), **Volume 4.** ISBN 909528-19-5, 432 pp. Papers presented at the seventh annual conference held in Melbourne in May 1981.

The conference theme was "Teaching and Learning in the Disciplines in Higher Education".

$18.00 ($9.00 for HERDSA members)

NEW: Moses, Ingrid (Editor (1983), **Volume 6,** ISBN 909528-29-2, 406 pp. Papers presented at the ninth annual conference held in Brisbane in May 1983.

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