Improving Postgraduate Education

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Abstract

It was reported more than 10 years ago that, "University graduate schools pay virtually no attention to methods of teaching and learning"[1]. Issues of conservatism and resistance to change that hold back the wider adoption of formal training in teaching and learning in postgraduate education were also raised[1]. Moreover, the Australian Federal Government recognised that the same problems had not been resolved during the last decade of the 20th century[2]. We examine literature from four interrelated areas of postgraduate education that cover: the political framework of higher education, institutional policy and practice, national accreditation bodies and the general field of education. We build the case that postgraduate education must attempt to forge a path that simultaneously satisfies both political and policy constraints, while delivering educational best practice. We propose that regardless of the constraints imposed on postgraduate education, and regardless of the prescribed policies, there are three underlying areas of concern that must be addressed for real improvement to occur: (1) the lack of formal training for postgraduate supervisors; (2) the lack of formal substantial induction into research for postgraduate students; and (3) the need to improve a range of 'micro-skills' in postgraduate students. One method of tackling this problem is to use the technique of action research to gradually introduce supervisors, students and peers to improve these areas of concern.

Introduction

More than 10 years ago, Cropley and Knapper[1] reported, "University graduate schools pay virtually no attention to methods of teaching and learning". They also raised issues of conservatism and resistance to change that hold back the wider adoption of formal training in teaching and learning in postgraduate education. The Research White Paper[2] published by the Australian Federal Government recognised that the same problems had not been resolved during the last decade of the 20th century. Indeed the Research White Paper drew attention to "A research training environment associated with poor supervision…" as well as "High attrition rates and slow rates of completion for research students" in the Australian postgraduate education environment.

Since the White Paper in 1999, Australian Government policy[3] has forced a greater focus on postgraduate education, for example through the impetus provided by the Research Training Scheme (RTS). However it may be argued that the RTS is largely 'retrospective' and sees quality in terms of value for money and public accountability, rather than adopting a quality approach that is 'prospective', focused on fitness for purpose and motivated by achieving a transformation in students. This may not be surprising given the first stated objective of the RTS is to "enhance the quality of research training *provision* in Australia"[3]. The concept of retrospective and prospective quality in higher education has been explored by Biggs[4] citing the work of Harvey and Green[5].

This paper examines literature taken from the field of postgraduate education and finds conflicting evidence regarding the success of postgraduate education in Australia. The full impact of the RTS is not yet evident; however it is possible to speculate that it will not lead to fundamental changes in prospective quality until the focus changes from "entitlements",

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"reporting requirements", "monitoring" and "allocation of funds"[3] to transformation and fitness for purpose (of the students rather than the scheme itself).

The literature examined can be divided into four interrelated areas that cover: the political framework of higher education, institutional policy and practice, national accreditation bodies and the general field of education. The paper builds the case that postgraduate education must attempt to forge a path that simultaneously satisfies both political and policy constraints, while delivering educational best practice.

The paper proposes that, regardless of the constraints imposed on postgraduate education, and regardless of the prescribed policies, there are three underlying areas of concern that must be addressed for real improvement to occur.

These areas of concern are:

- the lack of formal training for postgraduate supervisors,
- the lack of formal substantial induction into research for postgraduate students, and,
- the need to improve a range of 'micro-skills' in postgraduate students.

The paper presents proposals for addressing these areas of concern, ranging from the introduction of improved active training of postgraduate supervisors, through a method for all new postgraduate students to participate in training on research methods and practices, to the implementation of action research by supervisors as a means of addressing micro-skills in their students. The paper will discuss each proposal in turn, and examine the merits of each.

The paper ends with the conclusion that little real, quality improvement in postgraduate education will take place unless significant changes are made to the way that supervisors are developed and students are educated.

Review of Postgraduate Supervision Literature in Engineering

A critical review of the literature of postgraduate supervision can be broken into four related sections. These are:

- Literature from the political framework that underpins supervision practices in higher education.
- Examples of institutional literature on supervision published, for example, by the University of South Australia (UniSA) and that provided by the Queensland University of Technology (QUT). These represent each institution's attempt to interpret government policy within a sound pedagogical framework.
- Literature derived from national bodies such as the Higher Education Research and Development Society of Australasia (HERDSA) that attempts to guide the direction and quality of postgraduate supervision practice in Australia.
- Literature from the general field of education, and also that specific to the engineering discipline, that describes and debates best practice in postgraduate supervision, generally free from the political and institutional constraints outlined previously.

These four sources illustrate how best practice in supervision co-exists with the realities of funding and "quality" to establish the current supervision environment within which we operate.

Government Policy

Four publications capture the government's approach to the supervision of researchdegree candidates in Australia. The Research White Paper[2] identifies two factors that shape policy.

These are:

- "A research training environment associated with poor supervision…",
- "High attrition rates and slow rates of completion for research students".

From these followed the Research Training Scheme that funds research student places in universities on the basis of how many students graduate, not on how many enrol. This solves the public accountability issue of wasting funds on students who don't complete (in time), yet it remains to be seen whether it achieves the desired effect of bringing about a change in attrition/completion rates due to the quality of supervision.

Kemp's paper[2] is supported by Martin et al[6] showing a recent (since 1995/96) decline in completion rates for Masters and PhD students in Australia. While this supports new policy, it should be viewed in a wider context. Specifically, Martin et al[6] shows an *increasing* rate of completion by PhD and Masters students (within the expected time) *until* 1995/96 and a decline *thereafter.* The current decline may therefore be a symptom of changes to University funding *in general* that have occurred since 1996, rather than a general negative trend in postgraduate teaching and learning. Many questions remain unanswered. What was the cause of the *increasing* completion rates prior to 1996? Were the improvements to completion rates prior to 1996 a result of improving teaching and learning practice? Will the recent changes to postgraduate funding[2] reverse the recent decline? If the recent changes bring about a greater awareness of, and attention to, teaching and learning in postgraduate education then there is no doubt that this is a positive outcome. The newest addition to government thinking in teaching and learning[7] is refreshing as it focuses less on financial causes and effects, and more on pedagogical issues. While these may find support in the academic community, the principle expressed in the paper, (essentially the professionalisation of teaching in higher education) seems a sound one in relation to the critical issue of improving postgraduate supervision. The discussion paper confronts entrenched views on the requirement for formal qualifications in teaching and learning.

The paper 'Research Training for the 21st Century'[8] draws heavily from recent Australian and British reviews of higher education and identifies a number of areas of concern, both in terms of the skills developed by candidates, and also the preparation of students and staff for postgraduate activities. It makes many recommendations that generally support the broadest conceptions of good practice in research supervision and have undoubtedly informed the more recent publication described above.

University Literature

In this paper we examine two cases of specific approaches to the implementation of best practices in research education. Both the UniSA and the QUT publish guidelines on the practice of research supervision and the general administrative framework that shapes postgraduate activities[9 10 11]. These documents are, however, administrative and limited in any depth of discussion on the pedagogy of supervision. The QUT document offers more concrete assistance with the suite of questionnaires for use by supervisors and students.

National Bodies

Three national bodies have a role in influencing postgraduate supervision practices in Australia in the engineering discipline. Engineers Australia (formerly The Institution of Engineers, Australia (IEAust)) accredits undergraduate engineering awards. It does not, however, accredit postgraduate research awards in engineering. Cropley[12] states that its undergraduate accreditation process lacks any emphasis on formal teaching qualifications.

Given these facts, Engineers Australia exerts little influence over the practice of postgraduate supervision in engineering education.

The Australasian Association of Engineering Education (AAEE) holds annual conferences and publishes a journal that covers a broad range of pedagogical issues in engineering. Unfortunately the majority of the material is based on undergraduate teaching and learning. For this reason the AAEE also exerts little influence over postgraduate supervision pedagogy in engineering.

A third national body, HERDSA, on the other hand, publishes a wide range of "guides" on various aspects of undergraduate and postgraduate education. Guides address 'postgraduate supervision'[13] and the role of action research (and therefore critical reflective practice) on teaching and learning[14]. These publications differ from the body of literature, both in engineering and in general, in that they are informed by the Australian policy context (albeit with some time lag) and deal with topics in greater depth than conference and journal papers. They are also written as guides for staff development and therefore go some way towards addressing the shortfall in formal training in postgraduate supervision.

General Literature

Much of the current literature on teaching and learning focuses exclusively on the undergraduate paradigm, shown, for example, by Biggs[15] and Ramsden[16]. Neither excludes postgraduate teaching and learning, but the concept of 'constructive alignment'[15] that is so persuasive an undergraduate model may not translate well to the postgraduate paradigm. One reason for this may be the fact that in the postgraduate paradigm there may not yet be the influx of weaker students associated with the expansion of higher education that constructive alignment seeks strengthen. Another may be the focus on classroom teaching and assessment, both features that are generally absent in the postgraduate research context. The general principle that teaching and learning is deserving of a professional, reflective and formalised approach by academics is valid. For this reason these books, and others, such as Toohey[17], deserve to be included in a critical analysis of improving postgraduate supervision.

There is a reasonable body of literature that directly addresses the issue of improving postgraduate supervision. Johnston[18] identifies a fragmented national approach to improving teaching and learning and links such improvement to action research. Toncich[19] identifies the fundamental modes of supervision that exist as a starting point for reflective practice. This is the first step along longer path of developing professional self-awareness and deeper understanding that many supervisors will never confront without some motivating force. Given the natural conservatism of many academics described by Cropley and Knapper[1] it may be that this motivator can only come from a formal policy requirement. This issue is examined in Cropley[12] for engineering disciplines, especially at undergraduate level.

An interesting paper from the engineering domain[20] makes a telling link between the three areas of critical concern. The paper is ostensibly about the 'product' of graduate education, however it draws interesting conclusions about the drive for efficiency in postgraduate education. It sees a reduction in "teaching assistantships" for postgraduate students, either because they are seen to delay the core research activity of the student, or because funding constraints prevent it, as a result of this move to greater efficiency. The consequence, claim Shostak et al[20], of this is that postgraduate students are led to believe that teaching is not valued, and, students lose valuable opportunities to develop critical micro-skills in communication. The paper has, perhaps, identified a critical gap in the current Australian context. This gap may be expressed as follows: *if most academics themselves were once*

postgraduates, and if their training specifically devalues teaching (or does not offer it), to the point where it is no longer even undertaken during candidature, then is it any wonder that current, and future, generations of academics have neither received the formal training they need as teachers, nor see any need to do so? At the same time, how do the students expose themselves to authentic opportunities to communicate with others in an appropriate setting on a regular and intensive basis? Walker[21] states that the teaching of those micro-skills so necessary for the well-rounded postgraduate was absent 20 years ago.

The picture that is emerging, based both on the literature, and on our own observation, is:

- There is a well-developed body of knowledge on the pedagogy of teaching and learning for postgraduate supervision.
- Policy-makers are beginning to address the need to instil this knowledge in academics (though not necessarily from an altruistic motive),
- A large part of the potential solution may be to embed the necessary T&L education in the postgraduate candidature itself so that whether the candidate goes on to join academia or not, they benefit from the development of critical communications skills, and become accredited teachers in higher education.

The issue of micro-skills, distinct from its relationship to teaching and learning described above, has also received some attention in the engineering domain. Hoover[22], Hoffer and Wynne[23], Aman and Sweetland[24] (1989) and Primrose et al[25,26] all address what the latter refer to as "training" of postgraduates. This covers communication skills, research management skills, research skills (methodology) as well as more vocational matters including job-finding skills. The most notable feature of these papers is that the American model of postgraduate education (coursework plus thesis) seems to offer (and is deliberately used to offer) more scope for embedding training in micro-skills compared to the traditional "British" model of thesis-only. There is a view among some academics, driven by an innate conservatism, that anything that detracts from the thesis is bad.

Action Research to Improve Postgraduate Supervision

In the practice of teaching in higher education, experiential learning combines reflection on experience with deliberate efforts to improve practice. McMahon[27] links reflective practice to action research by recognising that many of the steps of both are essentially the same.

The methodology is particularly suited to solving problems[28] or to bringing about improvements of practice[29] in situations that have a strong social, or behavioural nature. Burns'[30] description of the uses of action research illustrates its strong relationship to teaching, teaching practice and the professionalisation of teaching in higher education, while at the same time breaking down the traditional conceptions of academic career development. McMahon[27] seeks to distinguish reflective practice from action research, citing the absence of 'strategic action' in reflective practice as separating it from the solution-oriented action research. This both reinforces the nature of action research, but possibly confuses the close relationship between the two. Reflective practice is a philosophical approach to teaching and action research is the methodology used in practice to embed the output of reflection in practice.

Checkland's[28] term, *human activity systems*, neatly encompasses a diverse range of fields including the practice of teaching in higher education. The central concept on which action research is based is the difficulty posed in trying to study 'complex, real social events in a laboratory, the artificiality of splitting out single behavioural elements from an integrated

system'[31]. This is true in seeking to improve practice in teaching, where the teacher cannot remain an external observer, but must accept a role as part of the field of study.

The cycle of action research is expressed in various forms, such as Checkland[28], focusing on the solution of problems in an industrial context, or that of Kemmis[29] or Burns[30], focused on education. Johnston[18] presents a similar format.

The key phases of a typical action research cycle focus on:

- Identifying and expressing a perceived problem, or a desire to improve practice;
- Planning action to take to solve the problem or improve practice,
- Taking action to solve the problem or bring about improvements,
- Observing the implementation of the action,
- Reflecting on the implementation,
- Repeating this cycle.

The action research cycle allows an incremental approach to improving practice in teaching (including postgraduate supervision).

The Action Research Activity

An activity centred on a group of students was conducted. The group consisted of five students enrolled part-time and employed by the same organisation. The cycle of action research is described in below. The activity was designed around a regular (monthly) group meeting of the students at their workplace, in addition to regular (usually fortnightly) meetings with individual students.

Developing a Supportive Culture in my Research Area

A goal in this action research is not only improving postgraduate supervision in a general sense, but especially to contribute to the development of a supportive culture for postgraduate research supervision in a research group at The Systems Engineering and Evaluation Centre – SEEC. This group has some 20 full-time academic staff and over fifty postgraduate research and coursework students. An important part of the actions research cycle is therefore the way that information on specific activities is shared with colleagues.

There are three ways that were used to disseminate the information and findings. First, at regular monthly research group meetings the AR project activity was publicised. The primary aim was to introduce the idea that reflective practice is an acceptable and 'normal' activity for supervisors. Second, to disseminate materials of use to colleagues, e.g. supervision questionnaires. Third, to introduce a formal proposal for a coordinated approach in the research group. To ensure an on-going effort to enhance postgraduate supervision in the group a 'SEEC teaching and learning forum' was set up. This was previously established (in 2001) as a tool for monitoring and assisting with a postgraduate coursework program, but is a logical vehicle for combining all of the group's interests in postgraduate education. The forum addresses the importance of a collaborative approach stressed, for example, by Johnston[18].

The Action Research Cycle

Step 1 – Analyse practice (identify problem or problems)

- Lack of formal, generic training in effective postgraduate supervision,
- Lack of formal induction and guidance of postgraduate students,
- Improvement of micro-skills, especially problem definition and communication.

Step 2 – Formulate changes to practice (to solve problem or improve practice)

Before formulating changes to practice it is profitable to consider the criteria that any changes made must be *systemically desirable* and *culturally feasible*[8]. Consideration of these factors helps to save time and effort by eliminating changes that are likely to prove unsuitable.

The changes proposed in the action research were selected because they offered immediate benefits to the participants, were as convenient as possible, contributed to the participants own research activities and simultaneously developed a deeper understanding of the research process that they were engaged in.

The complete set of changes was:

- Hold a regular (monthly) peer group meeting involving supervisor and students,
- Hold this meeting at their workplace to aid convenience,
- Require each student to make a presentation on a peer's research proposal,
- Disseminate information relevant to the postgraduate research process,
- Encourage peer-support,
- Encourage constructive discussion of student-supervisor issues.

Step 3 – Implement changes (to solve problem or improve practice)

The changes described in step 2 were implemented progressively over a three-month period (three meetings) commencing with an introduction to the requirement to make a presentation on a peer's research proposal (intended to boost peer support, develop a deeper understanding of the formulation of a proposal and to develop communication skills). This was followed by a session discussing the perceived accuracy of the presentation by the original student, and a discussion of the value of the process to both the presenter and the originator of the proposal.

In addition to this main thread of activity in the three meetings, at each meeting discussion papers were disseminated. In the first meeting this included the DETYA Higher Education Series paper on "Factors Associated with Completion of Research Higher Degrees". At this second meeting this included the QUT postgraduate student/supervisor questionnaires (QUT, 1998). At the third meeting this included Zuber-Skerritt's (1992) "Common Causes for Delay in Thesis Submission" and Sadler's lists of "Advantages and Disadvantages of Publication During Candidature".

Step 4 – Monitor effects of changes/action

Monitoring the effects of changes or actions presents challenges. It is arguable that any effects (on the students or supervisor) will take place over longer periods that three months, and may only manifest themselves in the final outcomes of the research process. Written feedback was asked for and provided by the students on their feelings about the presentation process. This was positive and enthusiastic and indicates a general satisfaction with the greater engagement, both with their as supervisor, and with their fellow students. Feedback in the form of the student questionnaires could be repeated after enough time has elapsed.

This work has had an effect on supervisors within the research group with several requesting

the questionnaires which have subsequently been used. The feedback has also been positive, indicating a willingness to engage in further discussion on improving postgraduate supervision. It has re-energised supervision enthusiasm and approaches to teaching activities by colleagues. In the case of postgraduate supervision it has been used to compile a package of materials that can be used as new students enrol that will satisfy a deficiency in induction processes and that will assist both supervisor and student in establishing a good working relationship from early on in the process.

Step 5 – Evaluate, reflect, and repeat

One exception is that, despite the convenient location, it has still been hard to schedule group meetings with the students, and for the students to work with each other independently of the supervisor. This is a reflection largely of the heavy workloads they carry.

It is hoped, however, that this will change if students feel that meetings valuable. The group has concentrated on activities and discussions with immediate concrete value to the students. Once students become accustomed to meeting as a group, on a regular basis, it is believed they will be reluctant to give this up.

It also remains to be seen what impact the activities may have on the behaviour of colleagues. The research group has monthly meeting to which all students are invited, but few attend. Our belief is that part of the task for improving the supervision of the group as a whole relates to the way these sessions are utilised.

Conclusion

After a critical review of the literature of postgraduate supervision in relation to Engineering it is clear that improving the quality of postgraduate education is a difficult task. We propose that through the incorporation of Action Research in to the postgraduate research supervision culture we can:

- Fit in to the political framework by improving the research supervision process and therefore reduce the attrition rates and timeliness of research students
- Incorporate some of the useful ideas from the well-developed body of knowledge on the pedagogy of teaching and learning for postgraduate supervision.
- Embed the T&L education to improve the postgraduate supervisor/student relationship, provide induction and improve a range of 'micro-skills' while providing value to the involved parties.

Early results from Action Research Activities on a group of students support the idea that this is a positive approach for research students and supervisors.

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