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TOWARDS A PEDAGOGY OF SUPERVISION IN THE TECHNOLOGY DISCIPLINES

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ACCESS TO FELLOWSHIP MATERIALS IS AVAILABLE VIA

The ALTC Exchange – (http://www.altcexchange.edu.au/group/pedagogy-supervision-technology-disciplines).

- This site includes all materials, including reports, presentations and workshops, produced during the course of the program.

QUT E-prints – (http://eprints.qut.edu.au/)

- This provides access to all papers and supervisor resources produced during the course of the Fellowship.

ACKNOWLEDGEMENTS

This Fellowship has been enriched, and indeed made possible, through the willing engagement of many participants from the information technology and engineering disciplines.

Supervisors at all levels and higher degree students have participated in workshops and interviews.

Others have given generously of their time to review and critique papers and resources at many stages of the Fellowship.

Staff of the ALTC have been unfailingly supportive and encouraging.

I am very grateful to every member of the Fellowship team; all have contributed significantly throughout. They have taken a constructively critical stance to all aspects of the program and have helped me negotiate many internal and external systems in order to be able to implement the program.

The content of this report draws heavily on text from previous papers prepared during the Fellowship program. Reference is made, where relevant, to earlier papers for further detail.

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EXECUTIVE SUMMARY

This Fellowship has developed a pedagogy of higher degree research supervision for the technology disciplines.

It has investigated technology discipline supervisors' thinking around pedagogy in the HDR context. It has explored what it means to think about postgraduate study and supervision in terms of teaching and learning.

The Fellowship has established a framework representing key aspects of supervisory pedagogy based on the viewpoints of discipline supervisors and has begun to explore how supervisors can be supported in achieving such a pedagogy, especially through the development of resources.

Technology supervisors think about teaching and learning in higher degree supervision in nine different ways:

- Upholding academic standards;
- Imparting academic expertise;
- Promoting learning to research;
- Promoting the supervisor's development;
- Enabling student development;
- Contributing to society;
- Venturing into unexplored territory;
- Drawing upon student expertise; and
- Forming productive communities.

Three approaches to supervision in the technology disciplines were identified:

- Scaffolding – emphasising the procedures of supervision, concerned with the need for structure for students.
- Relationship – emphasising personal interactions, concerned with the interactions and needs of the people involved.
- Direction setting – emphasising research objectives and outcomes, concerned with forwarding the research agenda.

Eight types of supervisory strategies were identified:

- Creating groups – drawing key players together for conversation.
- Creating structure – project managing or planning.
- Generating outputs – ensuring timely deliverables.
- Creating space – providing intellectual space.
- Establishing collaboration – forming learning communities.
- Focussing on the big picture – incorporating the context of the candidature.
- Negotiating expectations – setting up the program for success.
- Pursuing established programs – contributing to previously determined research agendas.

The framework constructed in this Fellowship program has enabled the development of resources for supervisors. These resources are likely to be of particular value to 'new' supervisors, supervisors mentoring less experienced colleagues or those wishing to refresh their supervision. It is also adaptable to other discipline contexts.

The framework does not prescribe practice, rather it offers a wide range of options for supervisors to consider.

The framework has been developed based on the views of supervisors at one institution and should be further developed based on a wider group of contributing supervisors in the technology and/or other disciplines.

Other insights from the Fellowship include:

- Supervisors seek many learning outcomes from candidatures which have strong alignment with institutional graduate capabilities.
- Large numbers of research students provide a natural impetus for collaboration between supervisors in the supervision process and the use of group supervision strategies.
- Technology senior administrators are committed to providing opportunities for experienced supervisors to reflect on their practice and developmental opportunities for less experienced supervisors.
- Contexts in which there is rapid (albeit planned) growth of research student numbers place significant strain on both experienced and less experienced supervisors.
- Technology supervisors prefer oral and group oriented modes of staff development to individual text based modes.
- Technology supervisors did not draw attention to any externally available resources or development opportunities in discussing helps and barriers to supervision.
- Some supervisors appear to remain uncertain about the alignment of graduate capabilities with their directions (possibly owing to lack of alignment between the language of the capabilities and the language they use to convey their intentions).
- The framework developed through the Fellowship program integrates many known aspects of supervision, providing a whole picture.
- Many parts of the framework are supported through existing development opportunities.

RECOMMENDATIONS FOR THE TECHNOLOGY DISCIPLINES

1. Promote a vision of pedagogical excellence in supervision as a critical element of quality in research training.
2. Adopt, and adapt where required, the pedagogical framework and supporting resources as development tools for supervisors.
3. Create opportunities for supervisory conversations around pedagogy to promote communication about supervision as a teaching and learning practice.

4. Create development opportunities for less experienced supervisors, such as quarterly meetings of members of this community to discuss supervisory issues and strategies.
5. Formally establish mentors for less experienced supervisors (i.e. supervisors without completions experience).
6. Increase support for supervisors and students; for example, by creating positions that will help supervisors and students achieve aspects of the higher degree research capability agenda.
7. Establish faculty level awards for excellence in higher degree research supervision.
8. Increase the cohort of post-doctoral researchers to provide career paths and to assist with the regeneration of supervision pedagogy.

KEY DELIVERABLES FROM THE FELLOWSHIP

The full list of deliverables from the Fellowship is listed in this report under "Listing of materials on Exchange site". All are available via the ALTC Exchange and the QUT E-prints Repository (see p. ii). We highlight several of these here.

1. *Resource for Supervisors*. The resource for supervisors is a version of the framework designed for easy reading, including reflective prompts, comments and quotes from technology supervisors, and references to further materials that support supervision. Extracts from the conceptual framework are also woven into the resource so that supervisors are made aware of the wider field of higher degree supervision scholarship.
2. *Student Resources for the use of Supervisors.* This resource for students is an adaptation of the *Resource for Supervisors*. It is a simplified version of the materials, for supervisors to use with students.
3. *Cases*. This document includes 44 cases, which are short, edited extracts from interviews with technology supervisors. Each case has been selected to stimulate thinking and discussion. The cases are grouped into themes, such as strategies, learning outcomes, roles and learning to supervise.
4. *Paper One. Project Plan and Conceptual Framework.*
5. *Paper Two. Review of the Conversations and Their Content.*
6. *Paper Three. A Pedagogical Framework.*
7. *Paper Four. Project Summary and Recommendations.*

Postgraduate supervisors in the technology disciplines now have access to a pedagogical framework that is grounded in research and based on understandings of possible pedagogical approaches.

A PEDAGOGY OF SUPERVISION FOR THE TECHNOLOGY DISCIPLINES

This Fellowship has developed a pedagogy of higher degree research supervision for the technology disciplines.

It has investigated technology supervisors' thinking around pedagogy in the higher degree research context. It has explored what it means to think about postgraduate study and supervision in terms of teaching and learning.

The Fellowship has established a framework representing key aspects of a pedagogy of supervision based on the viewpoints of technology discipline supervisors and has begun to explore how supervisors can be supported in achieving such a pedagogy, especially through the development of resources.

The framework created in this Fellowship has enabled the development of resources for supervisors. These resources are likely to be of particular value to 'new' supervisors or those wishing to refresh their supervision. They are also adaptable to other discipline contexts. The framework is presently based on the views of supervisors at one institution and should be further developed based on a wider group of contributing supervisors in the technology and/or other disciplines.

BACKGROUND

Research supervision is an integral, but often neglected, component of the teaching-research nexus. Researchers are used to:

1. researching their teaching;
2. teaching their research;
3. thinking about teaching (mostly at the undergraduate and honours levels) as a site of research practice, i.e. a space where students engage in research; and
4. thinking about teaching as a pathway to research.

This Fellowship focused on a dimension of the teaching-research nexus different from those listed above: research supervision as a site of teaching and learning practice, in the technology disciplines.

While most scholarship in postgraduate study and supervision focuses on higher degree study as a site of researcher training, this program adopts a research education lens (Boud and Lee, 2008). Scholars of research education are beginning to recognise that 'critical to how supervisors think about what they are doing when they supervise is whether they think of supervision as a teaching or as a research practice' (Brew and Peseta, 2008). In practice, while many universities position research higher degree supervision at least in some respect as a teaching and learning practice, typically supervisors largely consider supervision as part of their research endeavour rather than as part of their teaching endeavour.

What do technology supervisors want their students to learn as they progress through candidature? How do technology supervisors see *research* and *learning to research*? How do

supervisors' aspirations compare with the broader aspirations of the university community, as expressed for example through graduate attributes? What are the barriers that supervisors experience to helping their candidates learn? How can we encourage supervisors to think about supervision as a teaching and learning practice?

This program explored what it means to teach and to bring about learning from the perspective of research higher degree supervisors in the technology disciplines.

It focussed on ways of thinking about research higher degree study and supervision as a teaching and learning practice, especially around:

1. alternative supervisory pedagogies;
2. what supervisors want their students to learn; and
3. approaches and roles adopted in supervision.

The outcomes offer a range of options for supervisors to consider as they pursue their own supervisory practice.

USING THE FRAMEWORK FOR QUALITY SUPERVISION

The framework developed (for a summary see the 'Outcomes from the Fellowship' section of this report on p.7) provides technology supervisors with a range of options available to them with respect to supervisory pedagogy. It has been developed to highlight different aspects of thinking about supervision as a teaching and learning practice; as well as approaches, strategies and roles associated with supervision.

It is essential that supervisors, especially new supervisors, become aware of the diverse options available to them and are provided with systematic ways of thinking about their practices. Use of the framework will encourage supervisors to make choices based on broader, rather than more limited, repertoires. It will also encourage thinking about supervision as a teaching and learning practice.

The framework may be used to:

1. support less experienced supervisors looking for options in their approach to supervision as a teaching and learning practice; to help them identify possible roles, approaches, learning outcomes and ways of thinking about supervision;
2. support experienced supervisors in mentoring junior colleagues;
3. support experienced supervisors in refreshing their own supervision; and
4. support workshops and other development opportunities focused on supervisory pedagogy.

The benefits of thinking systematically about supervisory pedagogy may be simply evaluated through the use of questions such as:

1. How might your practice change?
2. How have you found these (workshops, materials, resources) useful?

BENEFITING THE EXPERIENCE OF HIGHER DEGREE STUDENTS

The Fellowship outcomes (see p.7) will benefit students' HDR experience by providing their supervisors with tools to a) adopt forms of supervision which respond to the needs of students, or b) make explicit their supervisory practices to students, or c) negotiate with students the preferred approaches and strategies of supervision.

A suite of resources arising from the Fellowship is available via the ALTC Exchange in a form suitable for sharing with students. These materials are not designed to be used by students in isolation. They are intended for use with supervisors or workshop facilitators engaging students in thinking and conversation.

Responses received at one of the workshops held during the course of the Fellowship indicated that the materials and ideas developed are most likely to benefit students who have already completed at least three to six months of higher degree studies. The experience gained during these early months is important in helping them to understand the value of the materials.

COMMENTS FROM STUDENTS

Students participating in the Fellowship program made the following comments[1]:

- *This could be useful for students.*
- *It gives insight into my supervisor's approach. I wonder if it could show how I can identify my supervisor's view and why this is their view.*
- *It could help identify different expectations, especially in the initial stages of the candidacy.*
- *If you know your supervisor's style, you can understand them better and think about how to manage them.*
- *The teaching views connect clearly with the learning views.*
- *Supervisors need to see how students see these things, too.*
- *My preferred supervisor would have a bit of everything!*
- *This would be a good communication tool, to open up conversations and explain why supervisors/students are doing some things.*
- *Maybe it would help to have a third party act as a mediator, to help supervisors and students talk about their different expectations.*

[1] These comments are also included in the section 'Description of the approach and methodology'.

OUTCOMES FROM THE FELLOWSHIP

The Fellowship was designed to:

1. develop insights into, and create awareness of, supervision as a teaching and learning practice, involving supervisors' views of their role, what it means to help students learn and the character of the higher degree research curriculum, as well as helps and barriers to achieving that curriculum;
2. create and build awareness of 'pedagogical' frameworks that are specific to the technology disciplines, and make resources available to supervisors and students; and
3. establish recommendations for policy and practice, for developing the framework in specific disciplines, and implications for other disciplines.

INSIGHTS INTO ASPECTS OF SUPERVISORY PRACTICE IN THE TECHNOLOGY DISCIPLINES

KEY RESEARCH FINDINGS

Technology supervisors:

- adopt nine different ways of thinking about supervision as a teaching and learning practice;
- use three varying approaches to supervision;
- adopt a wide range of supervisory roles;
- use a wide range of supervisory strategies akin to those found in other disciplines;
- seek a broad set of learning outcomes for the higher degree research process which align with institutional graduate capabilities;
- use distinctive and varied ways of thinking about research and learning to research;
- do not, as a broad group, reveal any 'signature pedagogy'; and
- focus primarily on issues of process, rather than 'discipline content', when discussing teaching and learning aspects of supervision.

The following are summaries of key findings from the Fellowship. For further details see *Paper Three* or the *Resource for Supervisors*.

NINE PEDAGOGIES OF SUPERVISION IN THE TECHNOLOGY DISCIPLINES

Technology supervisors think about teaching and learning in higher degree supervision in nine different ways, represented here as pedagogies. These nine pedagogies align with wider curriculum orientations identifiable in the higher education sector (see Table 1, p.8).

Table 1 The Nine Pedagogies and related curriculum orientations

Nine Pedagogies (ways of thinking about teaching and learning in supervision in the technology disciplines)	Summary description	Curriculum orientations
Upholding academic standards	Meeting the discipline and institutional communities' expectations	Academic discipline
Imparting academic expertise	Conveying expertise in research processes	Competency
Promoting learning to research	Meeting students' learning needs	Learning to learn
Promoting the supervisor's development	Pursuing the supervisor's established objectives	Personal relevance
Enabling student development	Seeking students' academic and professional maturity	
Contributing to society	Having social impact	Social impact
Venturing into unexplored territory	Discovering the research agenda together	Collaborative
Drawing upon student expertise	Building from existing student abilities	
Forming productive communities	Drawing key stakeholders together	

The Nine Pedagogies may also be presented showing their alignment with supervisors' experience of content, their intentions and strategies (Table 2) across the horizontal axis, and the main perspective adopted on the vertical axis.

Table 2 Supervisors' ways of thinking about teaching in the research context

Focus	*Content*	*Intention*	*Strategy*
	Teaching in the research context is viewed as:		
Supervisor perspective	1 Upholding academic standards	4 Promoting the supervisor's development	7 Imparting academic expertise
Student perspective	2 Promoting learning to research	5 Enabling student development	8 Drawing upon student expertise
Wider community perspective	3 Venturing into unexplored territory	6 Contributing to society	9 Forming productive communities

The Nine Pedagogies may be drawn together with other aspects of supervisory practice (each of these is described below) to form a framework for supervision (see Table 3 in the next section, 'The pedagogical framework' p.14). The different aspects of supervisory practice are expanded in resources developed for supervisors as part of the Fellowship program. They are also illustrated through a set of cases.

THREE APPROACHES TO SUPERVISION IN THE TECHNOLOGY DISCIPLINES

Three approaches to supervision in the technology disciplines were identified:

Scaffolding – When adopting a scaffolding approach, we emphasise the procedures of supervision. The scaffolding approach is concerned with the need for structure for students, especially around project management to encourage systematic progress.

Relationship – When adopting a relationship approach, we emphasise personal interactions. The relationship approach is concerned with the interactions and needs of the people involved in supervision.

Direction Setting – When adopting a direction setting approach, we emphasise research objectives and outcomes. The direction setting approach is concerned with forwarding the research agenda more than with pedagogy.

STRATEGIES OF SUPERVISION IN THE TECHNOLOGY DISCIPLINES

Eight types of supervisory strategies were identified.

Creating groups – drawing key players together for conversation, on a regular basis.

Creating or structure – project managing planning, with an emphasis on the process.

Generating outputs – ensuring timely deliverables, the outcomes aspect of project management.

Creating space – providing intellectual space, reducing structure to allow creativity and inspiration.

Establishing collaboration – forming learning communities, with the student as a colleague.

Focussing on the big picture – incorporating the context of the candidature, for example the student's career goals.

Negotiating expectations – setting up the program for success, by establishing high standards.

Pursuing established programs – contributing to previously determined research agendas.

VIEWS OF RESEARCH IN THE TECHNOLOGY DISCIPLINES

Different ways of seeing research in the technology disciplines were identified.

Research is seen as substantial. It is about working rigorously on difficult problems, resulting in substantial solutions. Some key ideas associated with this view are: substantial ideas,

tackling difficult problems, finding solutions, arriving at an informed view, sound methodology, 'good' results, rigor, hard work, disciplining the mind, intensive.

Research is seen as investigative. It is about strategic, evidence-based problem solving. Some key ideas associated with this view are: problem-solving techniques, persistence, being systematic, strategies for understanding, obtaining relevant resources, evidence-based.

Research is seen as meaning-making. It is about seeking meaning through the synthesis of complex data or knowledge. Some key ideas associated with this view are: gaining insight, finding solutions.

Research is seen as deepening. It is about increasing self awareness through an iterative, focussing process. Some key ideas associated with this view are: iterative, narrowing focus, deepening self, understanding your own contribution.

Research is seen as productive. It is about usefully satisfying a range of stakeholders. Some key ideas associated with this view are: useful to industry, satisfying stakeholders, commercial value.

Research is seen as explorative. It is about following speculative leads which challenge norms. Some key ideas associated with this view are: newness, following leads, thinking outside the square, big risks leading to big steps, exploring esoteric thoughts, asking big questions, questioning norms.

VIEWS OF LEARNING TO RESEARCH IN THE TECHNOLOGY DISCIPLINES

Different ways of seeing learning to research in the technology disciplines were identified.

Learning to research is seen as accepting constraints – disciplined application of basic skills to new areas. Some key ideas associated with this view are: developing habits, applying basic skills, methods and tools (to new problems), disciplining the mind, applying a high work ethic, grasping fundamentals, constructing an argument, interrogating existing research, seeking out resources, structuring any topic.

Learning to research is seen as apprenticed – imitating a master. Some key ideas associated with this view are: imitation, apprenticeship, following a model, walking alongside a researcher (initially), following expert advice, understanding process and standards.

Learning to research is seen as journeying – self-discovery by trial and error, towards independence. Some key ideas associated with this view are: working into the project, learning about self, discovery by trial and error, learning to choose focus, stumbling journey (with excellent hindsight), climbing by yourself (with encouragement and guidance), developing independence, being self-starting and self-monitoring, linking broad and deep knowledge, tolerating rejection and learning from it, learning to choose which advice to listen to.

Learning to research is seen as focussing – pursuing mature, world-class expertise of a passion. Some key ideas associated with this view are: pursuing a passion, aiming to be the world's

expert, developing into a mature researcher and colleague, embodying research, internal processes, shouldering responsibility for the research, 'hitting a gear'.

Learning to research is seen as contributing – exploring positive impact on others. Some key ideas associated with this view are: coming to understand the impact of research on society, striving for ethical research practice.

Learning to research is seen as stretching – being stretched in new ways. Some key ideas associated with this view are: expanding into new areas, big changes, cutting edge.

ROLES SUPERVISORS ADOPT IN THE TECHNOLOGY DISCIPLINES

Three types of roles were identified. These roles are not 'styles', they are not meant to represent 'typical stances', instead they lay out the range of options available to supervisors which may be adopted through a candidature.

Directing roles emphasise the supervisor's input into the candidacy, for example Manager or Director.

Collaborative roles emphasise supervisors working with students as equals, for example Partner or Colleague.

Responsive roles emphasise meeting students' needs. They are adopted as required throughout the candidature, for example, Mentor, Coach, Advisor, Networker, Supporter, Editor, Nurturer, Counsellor, Intermediary, Parent and Friend.

HELPS AND BARRIERS IN THE ENVIRONMENT

Both helps and barriers to the supervisory process can be classified as being about a) people and culture, b) resources, and c) synergies.

People and culture. Students bring a wealth of insights which stimulate supervisors to think differently about their area. For example, diverse cultures make the supervision experience enriching. Barriers might include poor student quality and inadequate language skills.

Resources. Institution administrative support, seminars and workshops on research topics, seminars and workshops on research processes were all identified as helps. Lack of finances and lack of time were key resource barriers.

Synergies. Synergies amongst students working in similar areas were uppermost in supervisors' minds. Student peer networks in related areas of study provide a diversity of input into each other's work. Low student numbers prevent synergy.

OTHER INSIGHTS FROM THE FELLOWSHIP

Other insights from the Fellowship include:

- Supervisors seek many learning outcomes from candidatures which have strong alignment with institutional graduate capabilities.
- Large numbers of research students provide a natural impetus for collaboration between supervisors in the supervision process and the use of group supervision strategies.
- Technology senior administrators are committed to providing opportunities for experienced supervisors to reflect on their practice and developmental opportunities for less experienced supervisors.
- Contexts in which there is rapid (albeit planned) growth of research student numbers place significant strain on both experienced and less experienced supervisors.
- Technology supervisors prefer oral and group oriented modes of staff development to individual text based modes.
- Technology supervisors did not draw attention to any externally available resources or development opportunities in discussing helps and barriers to supervision.
- Some supervisors appear to remain uncertain about the alignment of graduate capabilities with their directions (possibly owing to lack of alignment between the language of the capabilities and the language they use to convey their intentions).
- The framework developed through the Fellowship program integrates many known aspects of supervision, providing a whole picture.
- Many parts of the framework are supported through existing development opportunities.

THE PEDAGOGICAL FRAMEWORK FOR THE TECHNOLOGY DISCIPLINES

A summary version of the pedagogical framework for the technology disciplines is presented here in two forms.

Figure 1 below depicts all the elements of the framework and represents the central place of the Nine Pedagogies.

Table 3 summarises representative aspects of the framework, showing suggested alignment of the different elements with the Nine Pedagogies. Table 3 does not include Strategies and Environment because these do not map directly onto the Nine Pedagogies. Details are available in *Paper Three* and the *Resource for Supervisors.*

Figure 1 Elements of the Framework

The framework is not intended to be used to classify supervisors. It is intended to represent the conceptual tools available to supervisors as they engage in supervision as a teaching and learning practice. Supervisors aware of the range of tools would be in a position to select the space within which they operate, taking into account many aspects of their context, for example the needs of the student, the stage of the candidature and the needs of the wider group of students or research team.

Fuller versions of the framework are available in *Paper Three* and also in the form of a *Resource for Supervisors*.

Table 3 Framework for thinking about the pedagogy of supervision

Nine Pedagogies		Supervisors' approaches	Sample learning outcomes	Supervisors primarily see research as	Supervisors primarily see students learning to research as	Supervisors' suggested roles	Curriculum orientations
Supervisors see teaching research students as	Supervisors direct attention towards						
Upholding academic standards *Meeting the discipline and institutional communities' expectations*	Established academic standards	• Scaffolding • Direction-setting	• quality publications • topic expertise	**Substantial** *Working rigorously on difficult problems, resulting in important breakthroughs*	**Accepting constraints** *Disciplined application of basic skills to new areas*	Manager	Academic discipline
Imparting academic expertise *Conveying expertise in research processes*	Supervisor's knowledge and skills	• Scaffolding • Relationship	• academic writing • literature review • technical skills	**Investigative** *Strategic, evidence-based problem solving*	**Being apprenticed** *Imitating a master*	Manager	Competency
Promoting learning to research *Meeting students' learning needs*	Students' learning needs	• Scaffolding • Relationship	• to become an expert • reflection • study habits	**Meaning-making** *Seeking meaning through the synthesis of complex data or knowledge*	**Journeying** *Self-discovery by trial and error, towards independence*	Coach	Learning to learn
Promoting the supervisor's development *Pursuing the supervisor's established objectives*	Supervisor's research agenda	• Direction-setting	• join established team • enter supervisor's projects	**Deepening** *Increasing self awareness through an iterative process*	**Focussing** *Pursuing mature, world-class expertise*	Director	Personal relevance
Enabling student development *Seeking students' academic and professional maturity*	Student maturity	• Relationship	• mature researcher • question status quo			Nurturer	

Nine Pedagogies		Supervisors' approaches	Sample learning outcomes	Supervisors primarily see research as	Supervisors primarily see students learning to research as	Supervisors' suggested roles	Curriculum orientations
Supervisors see teaching research students as	Supervisors direct attention towards						
Contributing to society *Having social impact*	Society's needs	• Direction-setting • Relationship	• develop innovative solutions	**Productive** *Usefully satisfying a range of stakeholders*	**Contributing** *Exploring positive impact on others*	Partner	Social impact
Venturing into unexplored territory *Discovering the research agenda together*	New frontiers	• Direction-setting • Relationship	• employ out-of-the-box thinking	**Explorative** *Following speculative leads which challenge norms*	**Stretching** *Being stretched into new areas*	Colleague	Collaborative
Drawing upon student expertise *Building from existing student abilities*	Student's contribution	• Relationship	• become world expert • teach the supervisor			Guide	
Forming productive communities *Drawing key stakeholders together*	Community's contribution	• Direction-setting • Relationship	• develop networks • span disciplines			Colleague	

Note: As supervisors… a) We may 'locate' our supervision in different parts of the framework in different contexts; b) We are unlikely to ever adopt only one frame, but we are more likely to blend more than one frame in response to variables like the student's need, the topic, the stage of candidature; c) We may emphasise, or prefer to identify with, particular parts of the framework; d) We could deliberately choose to adopt aspects most appropriate to our circumstances.

RECOMMENDATIONS ARISING FROM THE FELLOWSHIP

Recommendations arising from the Fellowship are presented here for a) the technology disciplines; b) the ALTC and other stakeholders; and c) Student Research, Graduate Training Centres or similar organisational units.

RECOMMENDATIONS FOR THE TECHNOLOGY DISCIPLINES

1. Promote a vision of pedagogical excellence in supervision as a critical element of quality in research training.
2. Adopt, and adapt where required, the pedagogical framework and supporting resources as development tools for supervisors.
3. Create opportunities for supervisory conversations around pedagogy, to promote communication about supervision as a teaching and learning practice.
4. Create development opportunities for less experienced supervisors, such as quarterly meetings of members of this community, to discuss supervisory issues and strategies.
5. Formally establish mentors for less experienced supervisors, especially supervisors without completions experience.
6. Increase support for supervisors and students; for example, by creating positions that will help supervisors and students achieve aspects of the higher degree research capability agenda.
7. Establish faculty level awards for excellence in higher degree research supervision.
8. Increase the cohort of post-doctoral researchers to provide career paths and to assist with the regeneration of supervision pedagogy.

RECOMMENDATIONS FOR ALTC AND OTHER STAKEHOLDERS

9. Seek deeper understandings of the higher degree research curriculum as seen from supervisor and student perspectives.
10. Further develop the pedagogy of supervision framework within the disciplines of IT and Engineering.
11. Adapt and develop the pedagogy of supervision framework in relation to other disciplines.
12. Develop resources associated with the framework (e.g. electronic resources and video vignettes) for the technology disciplines.
13. Consider supporting a large scale survey of the views and practices of individual supervisors in relation to graduate capabilities, as suggested by Borthwick and Wissler (2003, p.10).
14. Consider awards and grants particularly focused on the higher degree research and supervision arena[2].

[2] This recommendation is very similar to Recommendation 7 in Borthwick and Wissler (2003, p.7): “Request AUTC to consider an award category for collaborative programs in the postgraduate arena”.

RECOMMENDATIONS FOR STUDENT RESEARCH AND GRADUATE TRAINING CENTRES

15. Make the Pedagogy of Supervision framework available to technology supervisors as part of the Student Research Centre standard suite of resources.
16. Link existing 'graduate capability statements' with expressions of learning outcomes using the words of supervisors from the technology disciplines, to assist with supervisor buy-in to the agenda.
17. Adapt and develop the framework in relation to other disciplines. For example, if technology specific identifiers were removed it may be of use in other spaces.
18. Link supervisors to resources on a needs basis (e.g. link aspects of the technology framework to specific existing resources that will provide further development in the area).
19. Request technology (and other) faculties to work with supervisors and students to adapt university higher degree research graduate capabilities to the faculty's disciplinary context, for instance by providing examples of planned learning outcomes that relate to each capability within the faculty context.
20. Propose faculty or school level awards for excellence in higher degree research supervision and identify markers of excellence, including clarity of pedagogical intent.
21. Survey students about their higher degree research learning experiences, at the point of completion of candidature.
22. Incorporate aspects of the framework into programs for students post submission of the detailed research proposal.

DESCRIPTION OF THE APPROACH AND METHODOLOGY

The guiding paradigm behind the research approach and techniques adopted is constructionism (which may be described as: 'the view that all knowledge… is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context'; Crotty, 1998, p. 42).

The approach to engaging in conversations with supervisors and constructing the framework was developmental phenomenography (see Marton and Booth, 1997; Bowden and Green, 2005).

The Fellowship builds on Bowden and Marton's (1998) contentions regarding the character of 'collective consciousness' or 'collective awareness' in relation to learning and research. They describe collective awareness in relation to learning as "the degree of awareness among teachers and students of the other's ways of seeing", and researchers' collective awareness as "the degree of awareness amongst researchers and graduate students of the others' ways of seeing" (p. 196). This Fellowship focuses on the awareness of teachers as the first step in moving towards collective awareness between supervisors and students.

The idea of collective awareness may also be interpreted at the organisational level, where it is described in terms of the extent to which members of an organisation are aware "… of the ways in which phenomena of common concern appear to other members" (p. 201). The collective consciousness comprises both what is common and what is complementary. For the university community to benefit, these different ways of thinking must be brought into focus.

In relation to the pedagogy of supervision, influencing the collective awareness of the university community meant:

1. bringing the pedagogy of supervision into focus; and
2. raising awareness of common and complementary ways of seeing the pedagogy of supervision, in this case in the technology disciplines.

This was achieved by targeting staff learning at both the individual and collective levels (Bruce, Chesterton & Grimison, 2002). In this program learning at the collective level occurs as supervisors share their differing understandings of the pedagogy of supervision in small groups and development contexts. This helps move the community of practice towards mutual awareness of such pedagogy.

Learning at the individual level occurs as supervisors recognise their current repertoire of understanding and expand their existing awareness through becoming aware of a wider range of possible approaches. Individuals also become aware of the need to change the focus of their attention as they adopt different pedagogies. They begin to recognise alternative pedagogies through understanding the differences between them. This is the cornerstone of 'variation theory' (Marton and Booth, 1997; Marton and Tsui, 2004).

The overall process involved three key phases, outlined below.

PHASE 1: BRINGING THE PEDAGOGY OF SUPERVISION INTO FOCUS I

This first phase of the Fellowship investigated and documented technology educators' ways of thinking about HDR supervision as a teaching and learning practice.

Full details of the methodology used for this phase of the Fellowship are available in *Paper Two*.

Insight and awareness of technology supervisors' thinking about supervision in terms of teaching and learning was achieved through holding conversations with supervisors with varying sub-disciplinary interests and experience about higher degree research supervision from a teaching and learning perspective. Twenty-two interviews and two workshops were conducted in the first three months of the Fellowship.

This phase adopted the idea of 'talking about supervision as teaching and learning' in order to both raise awareness of supervisory pedagogy amongst supervisors, and elicit data from which to understand supervisors' perspectives and build a pedagogical framework. 'Talking about supervision' involved the facilitation of many conversations with individuals and groups about teaching and learning related aspects of supervision.

Key objectives were to gain insights into technology supervisors':

a) ways of thinking about supervision as a teaching and learning practice;
b) perceptions of their role;
c) views on what it means to help HDR students learn;
d) views on the character of the curriculum; and
e) helps and barriers to achieving that curriculum.

Holding conversations with supervisors in small group and workshop contexts raised awareness of each others' approaches. Interest in adopting the approaches of colleagues was explicitly commented on in evaluation responses. Individual interviews enabled supervisors to become aware of their own, previously implicit, thinking. Supervisors' new self-awareness was commented on explicitly in their evaluation comments.

PARTICIPANTS IN THE CONVERSATION IN THE FIRST PHASE

Due to the qualitative nature of the present study, we did not seek a statistically representative sample of the wider context. The sampling strategy is better described as 'purposive', seeking representation from supervisors at different academic levels and with different kinds of supervisory experience.

Twenty-nine supervisors participated, representing all levels of academic appointment across both discipline areas. Supervisors with a range of completions experience were interviewed. The interview schedule and questions responded to in workshops are identified below.

INTERVIEW SCHEDULE

The following conversational prompts were used in interviews:

- Describe the approaches to HDR supervision that you use.
- What do you expect a HDR candidate to learn during their candidature?
- What is your role in this process?
- What helps you fulfil your role and what makes it difficult for you to fulfil your role?

WORKSHOP QUESTIONS

Workshop participants were invited to respond to the following prompts:

- Brief description of my strategy(ies).
- How I implement it.
- What I expect students to gain.
- Other benefits of the strategy.
- How do I know my students have benefited.
- The most important thing I want my students to learn is:
- Helps to my students' learning are:
- Barriers to my students' learning are:

EVALUATION

Evaluation was built into both the workshops and the interviews. Participants were invited to reflect, as part of the conversation, on the benefits of participating. Their reflections, reported in *Paper Two* (Section 4), include:

It helped me reflect on the way my supervision had evolved into the way it is now. (I1)

I don't think I have been thinking about this as much as I should've been. It's made me reflect on what is an appropriate level of supervision as an associate and as a principal and what is an appropriate workload. (I8)

It has reinforced my respect for the wisdom and expertise of my academic colleagues (W7)

As with exercises of this type, it's interesting to hear myself pontificate about these things. It maybe makes me think that I should be perhaps a little bit more conscious about what I'm doing with my students. It's useful to be challenged with these kinds of questions and to think about them. (I19)

I've certainly learned that I think that I'm overloaded in the supervision space at this point in time. Learning to say "No" is something I'm just going to have to do, as much as I'm thoroughly interested in the topics presented and as much as I really love the students and would love to say "Yes" I'm just going to have to start saying "No". (I8)

It's made me discover different styles of supervision that hopefully will help me compose my own style. (W13)

I think every time I talk about this I realise that I could structure this even more. You have all these things in your head and someone says, "Talk about this" so you make a mental list of all these bullet points. It would be nice to formalise this even further somehow. (I12-2)

I think trying to come up with strategies on how to approach supervision on a weekly basis would be quite helpful. I tend to just go to a meeting and say, "Tell me what you are doing" without having any long-term guiding strategy. So perhaps that's something that I should think about more. (I15)

I didn't realise I was so passionate about Higher Ed! (W4)

I'm about to take on some new students and think now that I have been able to formulate these principles into stages I'll be able to better articulate those. So, while I was practising those before it wasn't necessarily something that I was verbalizing to the students. Whilst you don't necessarily want to lay it out in that same way for students, I'll be more conscious of the framework and be able to perhaps draw on it more. (I9)

I will probably be more aware of what I'm doing the next time I'm talking to my students. I will hear my own voice saying "You said you do this, are you really doing this? Are you really understanding their goals? Have you talked to them about this?" (I10)

Postgraduate supervisors in the technology disciplines now have access to a pedagogical framework that is grounded in research and based on understandings of possible pedagogical approaches.

PHASE 2: BRINGING THE PEDAGOGY OF SUPERVISION INTO FOCUS II

The purpose of this phase was to develop a framework for a pedagogy of supervision in the technology disciplines of use to supervisors and leaders in the higher degree context, for enhancing supervision in the technology disciplines.

The framework was developed based on:

a) descriptions of different ways of thinking about teaching and learning in supervision (the Nine Pedagogies). This involved identifying significant differences in views and the key elements of focus associated with each of these views;
b) outcomes from the first phase of this Fellowship; and
c) other existing research outcomes available in the literature, for example around students' and researchers' views of research and learning to research.

Constructing and building awareness of the 'pedagogical' framework that are specific to the technology disciplines was achieved through:

- The analysis of technology supervisors' conversations from interviews and workshops to establish the range of thinking.
- Suggesting the alignment, at least on an analytical level, of particular views with supervisory approaches, roles and the learning outcomes sought.
- The presentation of the framework in *Paper Three*.

- Continued conversation about the framework with various parties; and continuous modification for communicability.
- Dissemination of the framework through school meetings, seminars, e-mail and the ALTC Exchange.
- Creation of resources for supervisors.

In this phase of the Fellowship, conversations with members of the Fellowship team and other stakeholders assisted in the progressive evaluation of the framework development. The framework construction was a process of continuous cycling through conversations and response in the form of modification to the framework.

EVALUATION

Examples of feedback from participants in the continuing conversation at this stage appear below Feedback was used to continue the process of development.

- Introduction – *useful and easy to read.*
- Table 1 – *could personally identify with different parts of the table.*
- Table 2 – *'working holiday', 'spy infiltration' are meaningless/barriers.*
- Supervisory roles – *I can use these for thinking about how different members of the supervisory team can contribute, work together.*

PHASE 3: RAISING AWARENESS OF COMMON AND COMPLEMENTARY WAYS OF SEEING THE PEDAGOGY OF SUPERVISION

This last phase of the program was, in many ways, a continuation of the first phase. From the earliest parts of the program, supervisors were involved in conversation as individuals, in small groups and pairs in order to raise their own and each other's awareness of supervisory thinking around the pedagogy of supervision.

In this phase that discussion was able to continue, with a new range of contributors around the framework constructed in Phase two.

Discussion opportunities involved the Fellow, the Project Officer, team members, supervisors and students and senior administrators in the Faculties of Built Environment and Engineering, and the Faculty of Science and Technology at QUT. Colleagues from other universities in the technology disciplines and associated with the ALTC were also invited to provide feedback and/or attend a workshop.

DISSEMINATION

- Staff Development opportunities for supervisor seminars working with outcomes from the program, providing feedback and considering implications for personal practice.

- A workshop for students around key outcomes from the program inviting their responses and reflection on the potential value of the material to research students.

- Discussions with Deans, Assistant Deans and the Dean of Graduate Studies around program recommendations and future developments.

- A final Fellowship meeting to discuss outcomes and celebrate the conclusion of the project to which Carrick/ALTC Citation and excellence Award winners, as well as other teaching Award winners from the technology disciplines in South East Queensland, were invited.

EVALUATION COMMENTS FROM INDIVIDUALS – EXPERIENCED SUPERVISORS

- *It helped me reflect on the way my supervision had evolved.*
- *This makes you realise you've got to think of new ways of doing things.*
- *I am very intense in supervision. My students have complete structure. Perhaps they should have freedom to chase shadows.*
- *I may be too intuitive, too much emphasis on ideas. I need to adopt more of a planning approach.*
- *I need to think more about supervision as a group activity other than one-on-one.*
- *I do not use the word "pedagogical" – why not just say "teaching"?*
- *I like the quotes – they make it personal and give me something concrete to identify with.*
- *It's good to have time to reflect and consider new approaches and ideas.*

EVALUATION COMMENTS FROM INDIVIDUALS – EARLY CAREER SUPERVISORS

- *As a soon-to-be supervisor this gives me ideas about how I might approach and plan my 'supervision style'. I may develop a more structured yet individual framework that includes more attention to graduate capabilities.*
- *I have never thought about my supervision at a methodological level before, nor have I analysed the methods that I have applied in my supervision. These materials inspired me to think about supervision at a high level and in a systematic way.*
- *I can use supervisory roles for thinking about how different members of the supervisory team can contribute, work together.*
- *I can see how I could use all of the approaches to supervision in different balances for different students, but how can I transition from one approach to another?*
- *This is a really comprehensive work and the papers are very well structured and presented. They are definitely useful and helpful for us to improve our supervision… inspire me to think about supervision at a high level and in a systematic way.*

EVALUATION COMMENTS FROM SUPERVISORS IN WORKSHOPS

- *I will incorporate this framework into my supervision. Particularly, I will focus more on outcomes. It will provide an interesting opportunity to track the success of different supervisory techniques with different students.*
- *It gave time to reflect and consider new approaches and ideas.*
- *It has reinforced my respect for the wisdom and expertise of my academic colleagues.*
- *I didn't realise I was so passionate about Higher Ed!*
- *Great catalyst for reflection. I would also like more strategies that I can apply directly in my supervision.*

- *I will consider other pedagogies. For example, I have not previously given much thought to 'contributing to society'. Also I can see that some pedagogies may be useful for different periods of a student's candidacy.*
- *It is great to have these resources, as there are few materials so concise for postgrad supervision. I have learnt we (PhD supervisors) have and use a lot of common strategies for supervision.*
- *This pack is well put together and provides many angles that could be useful. I like the concise nature and the quotes from the interviewed supervisors.*
- *This has crystallised some of my thoughts on supervision and also provided some stimulus for viewpoints I had not considered.*
- *I now realise the contradictions within ideas/views I thought I held.*
- *I may now be more varied for different students, and at different stages of candidature.*
- *Like the pack. First time anybody has provided the comprehensive list/overview of the outcomes, desires and processes of supervision.*

EVALUATION COMMENTS FROM STUDENTS

- *This could be useful for students.*
- *It gives insight into my supervisor's approach. I wonder if it could show how I can identify my supervisor's view and why this is their view.*
- *It could help identify different expectations, especially in the initial stages of the candidacy.*
- *If you know your supervisor's style, you can understand them better and think about how to manage them.*
- *The teaching views connect clearly with the learning views.*
- *Supervisors need to see how students see these things, too.*
- *My preferred supervisor would have a bit of everything!*
- *This would be a good communication tool, to open up conversations and explain why supervisors/students are doing some things.*
- *Maybe it would help to have a third party act as a mediator, to help supervisors and students talk about their different expectations.*

HOW THE FELLOWSHIP USES AND ADVANCES EXISTING KNOWLEDGE

HOW THE FELLOWSHIP USES EXISTING KNOWLEDGE

The Fellowship draws on two related fields of knowledge within the general area of higher education research and scholarship– firstly, the knowledge base around the pedagogy of supervision, and secondly, the knowledge base around researching the experience of higher education teaching and learning.

THE KNOWLEDGE BASE AROUND THE PEDAGOGY OF SUPERVISION

There is a considerable scholarship base associated with the pedagogy of supervision. Of particular interest to this Fellowship was research and scholarship associated with conceptions of research (Åkerlind, 2008; Brew,2001; Bruce, Pham & Stoodley, 2005; Bruce, Pham and Stoodley, 2009; Kiley and Mullins, 2005; Neumann, 1993; Prosser et al., 2008), conceptions of supervision (Murphy, 2004), conceptions of learning to research (Meyer, Shanahan & Laugksch, 2005; Wood, 2006), and aspects of supervision pertaining especially to the technology disciplines (Baillie, Emanuellson and Marton, 2001; Bruce, 2008; Bruce, Pham and Stoodley, 2004; Bruce, Stoodley & Pham, 2009; Ingerman, 2002; Ingerman and Booth, 2003; Lister, 2007; Pham, Bruce and Stoodley, 2005).

The concept of research education in which supervision is regarded as a teaching and learning practice has been promoted widely by Australian educational leaders, especially through the fIRST consortium, and collected works such as those edited by David Boud and Alison Lee (Boud & Lee, 2008; Green & Lee, 1999).

In the US, the Carnegie Foundation (Walker et al, 2008) completed a project supporting universities in scrutinising and making public their supervisory practice.

Attention to supervision specifically in the technology disciplines is still somewhat limited.

This knowledge base described above was used to:

1. identify literature on supervision in the technology disciplines that has been previously scattered or difficult to access;
2. develop a conceptual framework; and
3. make succinct summaries of selected scholarship in resources developed for technology supervisors.

The existing knowledge base on supervisory pedagogy is represented in *Paper One* from the Fellowship program. Subsequent papers add to this literature base through the provision of bibliographies on the topic. A bibliography of materials of interest to this area appears in a later section of this report (p.37).

THE KNOWLEDGE BASE AROUND RESEARCHING THE EXPERIENCE OF HIGHER EDUCATION TEACHING AND LEARNING

Existing scholarship associated with the process of researching learning in higher education was also used to inform:

- the conceptual framework;
- approaches to engaging supervisors in conversation through various parts of the Fellowship; and
- strategies used for constructing the framework.

In particular, the views of learning and approaches to researching learning associated with phenomenography (Bowden & Green, 2005; Bowden & Marton, 1998; Bowden & Walsh, 2000; Marton & Booth, 1997), made it possible to identify variation in ways of thinking about supervision

as teaching and learning. These approaches also provided the platform for exploring supervisory pedagogy based on supervisors' experience of content, their intentions and strategies (see Table 2, p.8).

THEORETICAL SIGNIFICANCE (HOW THE FELLOWSHIP ADVANCES EXISTING KNOWLEDGE)

The Fellowship advances knowledge by:

1. Identifying details of aspects of supervision associated with teaching and learning from the perspective of members of the technology community. Aspects included:
    a. approaches to supervisory pedagogy;
    b. strategies used;
    c. views of research;
    d. views of learning to research;
    e. learning outcomes articulated in the language of supervisors;
    f. supervisory roles adopted; and
    g. helps and barriers in the environment.
2. Identifying nine 'pedagogies' of supervision in the technology disciplines. Each pedagogy logically, or analytically, draws into alignment various aspects of supervision with supervisors' ways of thinking about supervision as teaching and learning. These ways of thinking are used as identifiers for each of the pedagogies. The pedagogies are artificial constructs intended to inform supervisors and provide a vehicle for self reflection and the identification of options; it is not expected that individuals would be readily identifiable with single pedagogies, rather that they would locate themselves across multiple parts of the framework.
3. Drawing the pedagogies and other aspects of supervision into a pedagogical framework representing a 'pedagogy of supervision for the technology disciplines'.

As has been stated earlier, the framework is not intended to be used to classify supervisors. It represents conceptual tools available to supervisors as they engage in supervision as a teaching and learning practice. Supervisors aware of the range of tools are empowered to select the space within which they operate, taking into account many aspects of their context, such as the needs of the student, the stage of the candidature and the needs of the wider group of students or research team.

The primary contribution of the Fellowship is in extending and deepening our knowledge of the discipline specific context. The framework provides an exemplar for similar work in other disciplines or other dimensions of supervision, for example on-line supervision or supervising international students.

In achieving the above, the Fellowship also extends and contributes to existing research and scholarship being conducted internationally, particularly research into researchers', supervisors' and research students' ways of seeing and thinking about research and learning to research, an area where Australian higher educators (for example, Angela Brew, Margot Pearson, Margaret Kiley and Gerlese Åkerlind) play a lead role.

EVALUATOR'S COMMENTS ON KNOWLEDGE ADVANCEMENT FROM PHASE ONE OF THE FELLOWSHIP

"I found that the key findings from Phase 1 of Christine Bruce's Teaching Fellowship, so ably summarised in… (*Paper Two*), make a significant contribution to current knowledge about HDR supervision, not only in the technology disciplines but also across all disciplines. While other authors have highlighted process and relationship supervisory approaches, Bruce et al.'s elaboration of these orientations is a very helpful extension of current research on HDR supervision. So too, while other authors have sought to describe supervisory roles before, Bruce et al.'s research provides more detail on how each of these roles are perceived by technology supervisors and adds a few new descriptors to regular lists (e.g. presales consultant, custodian). It was also really helpful to contextualise this participant group with the national data collected by the Ryland survey. Mapping the supervisors' desired key learning outcomes for their students against the graduate attributes was a very helpful contribution to positioning HDR studies as having a curriculum; a notion that has remained very implicit in most HDR models originally imported from Britain." Comments received from Catherine Manathunga, 2 June 2008.

"Mapping the supervisors' desired key learning outcomes for their students against the graduate attributes was a very helpful contribution to positioning HDR studies as having a curriculum; a notion that has remained very implicit in most HDR models originally imported from Britain." Catherine Manathunga, Fellowship Evaluator.

FACTORS THAT WERE CRITICAL TO THE SUCCESS OF THE APPROACH

COMMITMENT OF SUFFICIENT FUNDS FOR FOUR DAYS A WEEK OF PROJECT OFFICER SUPPORT

For this Fellowship, which included working with large amounts of data, negotiating with many individuals and teams, and the continuous revision of multiple documents, the support of a project officer proved essential. The support of this person was key to enabling smooth progress and timely completion.

TIMING OF THE FULL TIME COMPONENT

For this Fellowship, the timing of the full time component in the last three months allowed full attention to the detail required at that point in the program. As the Fellowship progressed, the number of different aspects of the program and outputs that had to be simultaneously managed increased. Successfully negotiating this period would not have been possible without the release time.

INTEGRATION OF EVALUATION AND DEVELOPMENT INTO THE PROGRAM PROCESSES

> "The program deliberately gathers evaluative data on the benefits to participants of being involved in the interviews and workshops".
>
> Catherine Manathunga, Fellowship Evaluator.

- *Monitoring of Impact*. All participants in workshops and interviews were given the opportunity to reflect on the benefits to them of participating in the conversation.
- *Monitoring of 'engagement'.* The above processes enabled the Fellowship team to monitor levels of engagement in the process. Other signs of engagement identified through observation included a) the willingness of the professoriate to participate in the program and to engage in conversation in different forums; b) The perseverance of staff in workshops, e.g. no signs of leaving early; and c) Fast turn-arounds to requests for information or participation.
- *Meetings with the Fellowship evaluator.* Regular review of process by the Fellowship evaluator.

EVALUATOR'S COMMENTS ON THE PROCESSES BUILT INTO THE FELLOWSHIP PROGRAM

"Another key strength of the whole project is its inbuilt dissemination, evaluation and professional development mechanisms. The project deliberately (intentionally) gathers evaluative data on the benefits to participants of being involved in the interviews and workshops. These data clearly exemplify the reflective, self-assessing outcomes of both activities and the benefits of hearing other supervisors describe their supervisory approaches in the workshops. The deliberate probing past the instant responses of 'I don't know' what I've learnt or what might happen to my supervisory practice was crucial in helping participants move to deeper levels of reflection, thinking and planning for future change or development." Extract from evaluator's comments received Tuesday 2nd June 2009.

MAKING GOOD USE OF THE LEAD UP TO THE FELLOWSHIP YEAR

I had several opportunities to prepare for the Fellowship, focussed around work at QUT, maintaining my personal profile nationally and internationally, media opportunities and publication.

TAKING ADVANTAGE OF THE OPPORTUNITY TO REVIEW THE PROPOSED PROGRAM IN THE EARLIEST PHASES

- Modification of program aims upon commencement to reflect community needs,
- Minor modifications to the budget,
- Approved by the ALTC.

HIGH LEVELS OF SUPPORT WITHIN THE INSTITUTION

Support from the institution was expressed in several forms. This has been critical to the success of the Fellowship and its ongoing impact.

1. First, the willingness of senior staff from disciplines areas and the Student Research Centre, including the Dean of Graduate Studies to sponsor the Fellowship, including serving on the Fellowship team.
2. Secondly, the provision of additional financial support to the program from different parts of the institution.
3. Thirdly, the allocation of significant release time for the Fellowship (in kind support) additional to the three months full time funded by the ALTC. This was a recognition of the importance of the Fellowship to the school and the direct impact it was intended to have on helping research supervisors. The release time made it possible to a) undertake a program that had a sound research base and b) take the Fellowship through to the stage of developing resources for supervisors.
4. Fourthly, the openness of many parts of the institution to the opportunities arising from the Fellowship, including the creation and implementation of seminars and workshops, and seeking future directions for the program.

FACTORS THAT IMPEDED SUCCESS

I was fortunate to experience no significant impediments in the Fellowship. The minor impediments were unexpected and ultimately contributed significantly to my own learning from the program.

1. First, I had to reconsider my assumptions regarding my familiarity with the preferences, learning and working styles governing my own discipline. In particular, the strength of the oral culture in the technology disciplines was notable. Combined with the general busy-ness of academics, this meant people preferred meetings, workshops and conversations to reading.
2. Second, working with a discipline that was unfamiliar to me (Engineering) meant that the initial start up in that area was slower than in my own discipline area. More ground work on my part prior to the commencement of the Fellowship would have helped. Having members of the Fellowship team from the unfamiliar discipline was a considerable advantage in

responding to this challenge. By the end of the Fellowship program the team was sufficiently known in the 'unfamiliar discipline' to make it easier to complete the latter stages of the Fellowship, involving implementation and dissemination.

3. Thirdly, the busy-ness of people's diaries made it difficult to achieve more than two meetings of the whole fellowship team in the course of the twelve months. While this did not impact the progress of the work, it meant that a large part of the interaction with the team was conducted on a one-to-one basis, reducing the opportunity for team members to interact with each other. In addition, the busy-ness of diaries meant that ALTC technology award winners and other recognised leaders were not able to accept the invitation to attend a final discussion and celebration at the end of the Fellowship. Such a meeting, for full effect, would need to have been scheduled several months in advance. Again, many of these colleagues have contributed through commentary and distribution of project details.
4. Fourthly, an original conception that was a little too broad in scope. For example, the program did not follow up some original ideas such as threshold concepts in learning to research.

AN ANALYSIS OF THE EXTENT TO WHICH THE APPROACH/OUTCOMES ARE AMENABLE TO IMPLEMENTATION IN A VARIETY OF INSTITUTIONS OR LOCATIONS

The approach to building conversations and the framework for the technology disciplines should be readily transferable to other disciplines.

The approach could also be used to modify or adapt the existing framework to other institutions and locations, both within the technology and other disciplines.

The outcomes for supervisors (resources and workshops) are designed to be readily adaptable to other contexts. There are no institution specific references in the *Cases*. In the *Resource for Supervisors,* the institution specific references are confined to banners signifying links to further resources, which are easily identifiable and modifiable.

While the materials are designed for ease of transfer, it has not been within the scope of the Fellowship program to explore this. This aspect will be tested in the next steps of the journey.

A DESCRIPTION OF THE WAYS IN WHICH THE FELLOWSHIP'S OUTCOMES HAVE BEEN OR WILL BE SHARED ACROSS THE HIGHER EDUCATION SECTOR, BOTH NATIONALLY AND INTERNATIONALLY

All materials and resources from the Fellowship are available via the ALTC Exchange. Key materials, the discussion papers and supervisor resources, are also available via QUT E-prints.

WITHIN QUT

The Fellowship program included:

1. discussion about supervision within the technology disciplines. In the latter phase of the Fellowship this included two development workshops for new supervisors, and a workshop for students in both Information Technology and Engineering.
2. a QUT wide supervisor development workshop, jointly led by Christine Bruce and the Manager of the Student Research Centre, on Supervision as a Teaching and Learning Practice. Guest panel members at the workshop were Professors Lars and Madeleine Dahlgren, from Linkoping University, Sweden.
3. a QUT wide seminar, convened by the DVC Teaching Quality, on the pedagogy of supervision.
4. engagement with, including seeking feedback from, higher degree research students, Deans and Assistant Deans Research, and Higher Degree Coordinators in Information Technology (Faculty of Science and Technology) and Engineering (Faculty of Built Environment and Engineering).
5. collaboration with the QUT Dean of Graduate Studies and others on recommendations flowing from the Fellowship.
6. discussion amongst the fellowship team of key outcomes and next steps.

ONGOING IMPACT AT QUT

At the Queensland University of Technology, where the Fellowship has been hosted, the Deans of the Faculty of Science and Technology, and the Faculty of Built Environment and Engineering have committed funds to advance the work of the fellowship. Current plans for advancement involve:

7. the further development of online resources;
8. a train-the-trainer program;
9. submission of applications for funding for continued work; and
10. further profiling of supervision as a teaching and learning practice to senior staff in the institution.

NATIONALLY

The Fellowship created opportunities for communicating with:

11. the ALTC Fellows' forum;
12. Carrick/ALTC Citation and Award winners in SE Queensland in relevant disciplines; and
13. the University of Southern Qld, cross-disciplinary research into supervisors' community of practice, including the discussion of outcomes from the Fellowship and recording of

interviews. USQ provides access to the outcomes from this program via links to the relevant ALTC Exchange site and also via videos summarizing the Fellowship outcomes.

Details of the outcomes from the program have been circulated to, or submitted for circulation to:

14. the Engineering Deans Network;
15. CORE (Computing Research and Education);
16. ISHODs (Information Systems Heads of Department);
17. the fIRST project;
18. the National Council of Deans of Graduate Studies in Australia; and
19. the HERDSA (Higher Education Research and Development Society of Australasia) list.

Poster and paper abstracts have been submitted to:

20. The 9th Quality of Postgraduate Supervision Conference, Adelaide, 2010.

INTERNATIONALLY

Aspects of the Fellowship and resources have been shared with:

21. colloquia at the School of Information Systems, University of Wellington, New Zealand. The colloquia introduced the program and focused on information technology students' views of the IT research domain;
22. colloquia at the Faculty of Education, University of Gothenburg LinCS Research Centre, Sweden. The seminar focused on the Nine Pedagogies and their relationship to information use; and
23. doctoral supervisors at the San Jose State University associated with the QUT-San Jose Gateway PhD program.

Following the completion of the fellowship, details of the program will be circulated also to colleagues for distribution at other universities.

A DISCUSSION OF ANY LINKS BETWEEN THE FELLOWSHIP, OTHER FELLOWSHIPS AND/OR PROJECTS IN THE ALTC STRATEGIC PRIORITY AREAS

There are a number of ALTC Fellowships and projects which are related in some way to the Fellowship program described in this report, either because they adopt similar theoretical frameworks (e.g. Lister and Edwards, and Åkerlind), or because they are connected with the Teaching-Research Nexus or Higher Degree Research Supervision. This Fellowship has had closest connections with the Edwards and O'Shea (2008) ALTC Leadership project, *The culture of teaching and learning in ICT & engineering*, which also had some early focus on supervision as a teaching practice. The simultaneous implementation of the two projects at the same institution appears to have benefited both projects. This Fellowship has also liaised in the early stages with the fIRST project, sharing resources and obtaining valuable background information from the surveys conducted in that project.

Technology

2008 The culture of teaching and learning in ICT & engineering: Facilitating research professors *to be* T&L leaders (Sylvia Edwards and Peter O'Shea) – http://www.altc.edu.au/project-culture-teaching-learning-qut-2007

2007 Teaching novice computer programmers: Bringing the scholarly approach to Australian ICT degrees (Ray Lister & Jenny Edwards) – http://www.altc.edu.au/altc-associate-fellow-raymond-lister

Teaching – Research Nexus

2008 Enhancing undergraduate engagement through research and inquiry (Angela Brew) – http://www.altc.edu.au/altc-national-teaching-fellow-angela-brew

2008 A threshold concepts and focus to curriculum design: Supporting student learning through application of variation theory (Gerlese Åkerlind) – http://www.altc.edu.au/project-threshold-concepts-focus-anu-2008

Supervision

2008 Promoting strategies and creating opportunities for inter/multimedia practice as a culturally appropriate dissemination tool for indigenous postgraduate research training (Sandy O'Sullivan) – http://www.altc.edu.au/altc-teaching-fellow-sandy-osullivan#program-summary

2007 Building research supervision and training across Australian universities (Jennifer Hammond, David Boud, Kevin Ryland& Mark Tennant) – fIRST project (http://www.first.edu.au/) – http://www.altc.edu.au/project-building-research-supervision-uts-2007

CONCLUSION

As I journeyed through this Fellowship I have become increasingly aware of how supervisors can be encouraged to think of their supervision as a teaching and learning practice. At the same time, I have gained a sense of the enormous scope of this process. There are teaching and learning issues which may be mirrored from undergraduate and other coursework practice such as transition in and out, the graduate capability agenda, workplace learning, and threshold concepts; and there are aspects specific to the HDR experience, such as supervisory roles and pedagogies, and concerns such as what it means to research and learn to research. All of these provide a wider territory that needs to be better understood as we work to improve supervision as a teaching and learning practice.

LISTING OF MATERIALS ON EXCHANGE SITE

A range of resources have been made available from this Fellowship to support supervisors in the technology disciplines. These are accessible to individuals and groups via the ALTC Exchange (http://www.altcexchange.edu.au/) and some material also through QUT e-prints (http://eprints.qut.edu.au/).

The materials are freely available for use and adaptation in workshops and other development programs. Key materials from the project are listed here.

Table 3 Resources developed from the Fellowship

Resource type		Title
Papers	1.	Bruce, C., & Stoodley, I. (2009) *Fellowship plan and conceptual framework.* (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.
	2.	Bruce, C., Stoodley, I., & Gasson, S. (2009) *A review of the conversations and their content*. (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.
	3.	Bruce, C., & Stoodley, I. (2009) *A pedagogical framework for the technology disciplines*. (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.
	4.	Bruce, C., Bell, J., Gasson, S., Geva, S., Kruger, K., Oloyede, K., O'Shea, P., Stoodley, I., Raymond, K., & Wissler, R. (2009) *Summary and recommendations.* (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.
Resources	5.	Bruce, C., & Stoodley, I. (2009) *Resource for supervisors.* (Towards a pedagogy of supervision in the technology disciplines series.)Brisbane: QUT.
	6.	Bruce, C., & Stoodley, I. (2009) *Student resources for the use of supervisors.* (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.
Workshops	7.	Bruce, C., & Stoodley, I. (2009) *Workshop for supervisors.* (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.
Cases	8.	Bruce, C., & Stoodley, I. (2009) *Cases from the technology disciplines*. (Towards a pedagogy of supervision in the technology disciplines series.) Brisbane: QUT.

Our intended audience for *Paper One*, *Paper Two* and *Paper Three* is:

- supervisors, administrators and academic developers in the technology disciplines who are interested in the views of their colleagues about supervision as a teaching and learning practice; and
- colleagues and academic developers in other disciplines who are interested in views from the technology disciplines about supervision as a teaching and learning practice.

Our intended audience for *Paper Four* is:

- administrators and policy-makers seeking a succinct overview of the Fellowship outcomes.

Our intended audience for the Resources, Cases and Workshop is:

- supervisors at all levels of experience, experienced supervisors would be most likely to use the resources in mentoring others.

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[Reports on a study of Australian doctoral students and supervisors from 28 universities. University type and research discipline influence timely completions, with higher rates from the more prestigious universities and from the natural sciences. Commentary is offered on the degree of involvement of supervisors with their students and the structure of the candidature.]

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FELLOWSHIP INFORMATION SHEET

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ALTC FELLOWSHIP PROFILE Nov 2008-Oct 2009

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TALKING ABOUT SUPERVISION IN THE TECHNOLOGY DISCIPLINES

This program aims to develop a framework for the pedagogy of supervision in the technology disciplines. The framework will be developed by investigating technology discipline supervisors' thinking and by searching the relevant literature. The viewpoints of technology supervisors will be collected using a qualitative methodology.

The outcomes will support strategic change in higher education institutions for the enhancement of learning and teaching at the HDR level. HDR supervision and its diversity has been a significant national issue for some time. There is a considerable literature attending to both what should be learned and how it should be learned or taught. As yet, however, we have little understanding of the value of these concepts to supervisors in the technology disciplines.

Significance: The process will raise awareness of HDR supervision as a teaching and learning practice, encourage sharing of practices amongst supervisors, and enable reflection and learning from research and scholarship.

Goals:

- To investigate and document technology educators' ways of thinking about supervision as a teaching and learning practice.
- To develop a framework, representing key aspects of a pedagogy of supervision, for use by supervisors and leaders in the HDR context for enhancing HDR supervision in the technology disciplines.
- To design recommendations for taking this agenda forward in consultation with key stakeholders across Australia.

Key Fellowship Activities: All strategies are designed to raise awareness of HDR supervision as a teaching and learning practice in different ways.

STRATEGY 1: BRINGING THE PEDAGOGY OF SUPERVISION INTO FOCUS I. This will involve using interviews and focus groups to investigate and document technology educators' ways of thinking about supervision as a teaching and learning practice.

STRATEGY 2: BRINGING THE PEDAGOGY OF SUPERVISION INTO FOCUS II. This will involve drawing together existing research and scholarship with the outcomes from Strategy 1 to develop a framework for use by supervisors and leaders in the HDR context for enhancing HDR supervision in the technology disciplines.

STRATEGY 3: RAISING AWARENESS OF COMMON AND COMPLEMENTARY WAYS OF SEEING THE PEDAGOGY OF SUPERVISION IN THE TECHNOLOGY DISCIPLINES. This will involve designing recommendations for taking this agenda forward in consultation with key stakeholders.

Fellowship team: Professor Christine Bruce (2008 ALTC Teaching Fellow, QUT); Dr Ian Stoodley (Fellowship Project Officer, QUT); Dr Catherine Manathunga (Fellowship Evaluator, UQ); Professor John Bell (Assistant Dean Research, BEE, QUT); Susan Gasson (Manager, Research Students Centre, QUT); Assoc Prof Shlomo Geva (Director of Research, SIT, FST, QUT); Kerry Kruger (Coordinator, Research Training, Research Students Centre, QUT); Professor Kunle Oloyede (HDR Coordinator, BEE, QUT); Professor Peter O'Shea (Professor, SES, BEE, QUT); Professor Kerry Raymond (Professor, FST, QUT); Professor Rod Wissler (Dean of Research and Research Training, QUT)