Towards a pedagogy of supervision in the technology disciplines

RESOURCE FOR SUPERVISORS
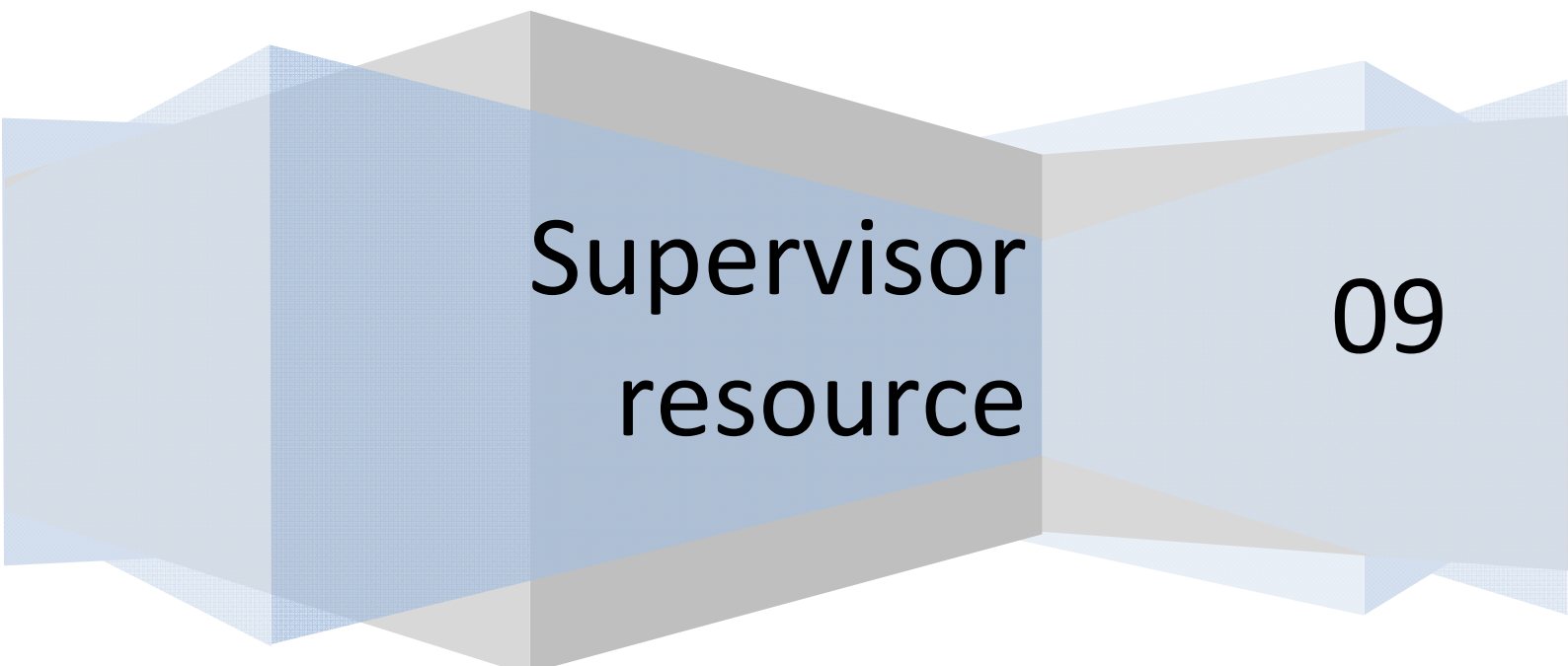
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Supervisor resource

09

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An e-version of this document may be found at:

> http://www.altcexchange.edu.au/
> http://eprints.qut.edu.au/

INTRODUCTION TO THIS RESOURCE

The framework presented in this resource is intended to provide 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.
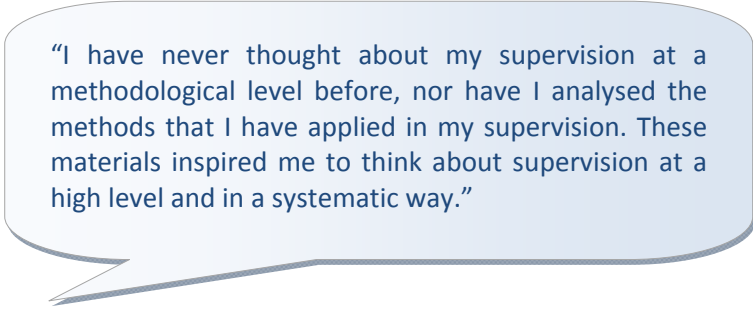
It will enable technology supervisors to become aware of the diverse options available to them and provide systematic ways of thinking about supervisory practices. Use of this framework will encourage supervisors to make choices based on broader, rather than more limited, repertoires. It will also encourage thinking about supervision as a teaching and learning practice.

The framework was developed based on:

- conversations with supervisors, in the form of interviews and workshops;
- analysis of the conversations to identify variation in ways of seeing various aspects of supervisory pedagogy, especially ways of seeing supervision as a teaching and learning practice, ways of seeing research and ways of seeing learning to research;
- logical alignment of different aspects of supervisory pedagogy with the nine ways of seeing supervision as a teaching and learning practice; and
- modification of the framework based on feedback from stakeholders including early career and experienced supervisors.

All the participating supervisors who contributed were from the technology disciplines and their words about supervision are included verbatim.

While the resulting ideas do not always appear technology specific, the framework 'belongs' to technology supervisors, in the sense that it comes from their discussion about what they do, rather than being created from external models and presented as a 'good thing'.
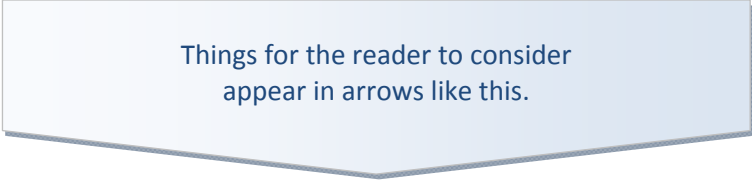
> "I have never thought about my supervision at a methodological level before, nor have I analysed the methods that I have applied in my supervision. These materials inspired me to think about supervision at a high level and in a systematic way."

READING THIS DOCUMENT
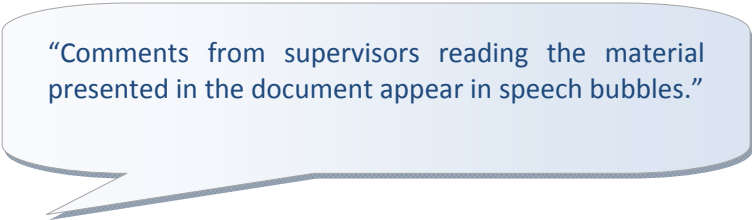
We have designed this document to make it easy to read. We have consistently used particular devices for the same purpose:

> Things for the reader to consider
> appear in arrows like this.

Quotes from supervisors talking about their supervision appear in blue boxes.

Throughout this resource direct quotes from conversations with supervisors are followed by reference to a specific interview ("I") or workshop ("W"). For example, "(I2)" means the quote is from Interview 2. Also indicated are the discipline, gender and experience level. The experience level ranges from no completions, experienced (1-5 completions), to very experienced (>5 completions).

"Comments from supervisors reading the material presented in the document appear in speech bubbles."

The banners refer you to additional QUT and other resources that might help.

CONTENTS

The 'pedagogical framework' presented in this paper **draws together the thinking of twenty-nine supervisors with different levels of experience, and who work in a range of contexts.**

For example with full time or part-time students, internal or external students, international and domestic students, in workplace or academic settings, with small or large numbers of students, and with students from many cultural backgrounds.

The framework also **draws on a range of research into aspects of research supervision** (see Bruce & Stoodley, 2009).

The supervisors who contributed came from the **technology disciplines**, including engineering, design and information technology.

Their multidisciplinary and interdisciplinary interests span mathematics, computer science, medicine, health, education, information science, and engineering infrastructure and design.

1. SUPERVISION AS TEACHING AND LEARNING

Supervising higher degree research can be thought of as being about teaching and learning. We can then consider it in terms of:

- our approaches to such 'teaching' or facilitating learning;
- the learning outcomes we seek;
- the strategies which it might be appropriate to use;
- the roles which may be appropriate for the supervisor, or team of supervisors to adopt;
- the environments in which we teach;
- our views of teaching and learning when supervising; and
- our view of research and learning to research.

Pedagogy refers to how we think about our teaching and learning. The very idea of what it means to teach and learn in the supervisory context is highly variable.

2. THE PURPOSES OF THIS FRAMEWORK

The framework has been developed especially for technology supervisors, to highlight different aspects of thinking about supervision as a teaching and learning practice; as well as approaches and strategies and roles associated with supervision.

The first purpose of this framework is:

- to help us think about supervision as a teaching and learning practice; to identify possible roles, approaches, learning outcomes and ways of thinking about supervision.

The second purpose is:

- to represent the alternatives available to us. As supervisors we may use many different approaches and strategies. Sometimes the approaches and strategies 'work' for the supervisors who use them, and sometimes they do not. If a particular strategy or approach is not working for a particular student, group of students, or in a particular time or place, it is useful to both new and experienced supervisors to have alternatives to consider and try.

This framework does not:

- prescribe supervision practice or provide failsafe solutions to supervisory challenges.

Various contingencies (for example, related to the student, supervisor, environment, topic, stage of candidature and type of research) will determine which aspects of the framework may apply to each supervision context and require the exercise of professional judgement on the part of the supervisor.

The framework for thinking about research supervision is **offered for use by individuals or groups of supervisors, as a tool for thinking about, planning, and refreshing supervision**.

It represents the ideas of colleagues, and is not intended to constrain us.

It would be most appropriate for the framework to be 'modified' to suit the needs to different contexts, situations or groups.

For example, some groups may prefer to use alternative language or labels, or may wish to add to the framework.

Some individuals or groups may choose to emphasise some aspects of the framework over others.

3. USING THIS FRAMEWORK

The framework for thinking about research supervision presented in these resources:

- draws together the different elements of technology supervisors' thinking about supervision as a teaching and learning practice;
- is constructed from research into technology supervisors' views; and
- may be used in many ways.

The framework could be used to ask:

- What options do I/we have?
- What if we were to do things differently?
- What if individuals or groups were to deliberately identify and experiment with alternative ways of thinking and acting?

If you are looking for:

- new ideas for how to work with your students – look at the **strategies** (Section 5.3);
- ideas for how members of a supervisory team may work together – look at **roles** (Section 5.7);
- ideas for what kinds of things you may want students to learn – look at **learning outcomes** (Section 5.4);
- ideas about possible ways of thinking about your supervision – look at **supervisory pedagogies** (Sections 5.1 and 6); or
- thoughts on how you might change your practice by adopting different strategies or roles – look at the **mappings** (Section 8).

If you are a new supervisor:

- You will find a wealth of ideas from colleagues with a wide range of types of experience.
- You will not find solutions to all your problems, but it will suggest systematic ways of thinking about what you are doing and give you many options to choose from with particular students.

If you are an experienced supervisor:

- You may enjoy the ideas from colleagues.
- You may find this document most useful as a tool for mentoring others or refreshing your own strategies.

If you are interested in thinking more about supervision as a teaching and learning practice consider accessing the QUT QIPS - Supervisor Solutions program. Refer to Section 9 of this resource.

4. THE PEDAGOGICAL FRAMEWORK (OVERVIEW)

This section shows both a short and a long version of the pedagogical framework for supervision (Tables 1 and 2).

In its short form (Table 1), the framework can be presented showing:

- supervisors' views of teaching research students (9 pedagogies) in the first column, followed in the remaining columns by
  - supervisors' views of research,
  - supervisors' views of learning to research,
  - possible supervisory roles, and
  - a set of 'curriculum orientations'.

The long version adds columns showing:

  - the focus of supervisors' attention,
  - supervisors' approaches, and
  - sample learning outcomes.

> Circle those parts of the framework that you use, or that seem familiar.
>
> Which parts would you like to explore further?

> "This makes you realize you've got to think of new ways of doing things."

Table 1 Framework for thinking about supervision in the technology disciplines (short version)

Supervisors see teaching research students as	Supervisors primarily see research as	Supervisors primarily see students learning to research as	Supervisors' suggested roles	Curriculum orientations
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; and d) we could deliberately choose to adopt aspects most appropriate to our circumstances.				
Upholding academic standards *Meeting the discipline and institutional communities' expectations*	**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*	**Investigative** *Strategic, evidence-based problem solving*	**Being apprenticed** *Imitating a master*	Manager	Competency
Promoting learning to research *Meeting students' learning needs*	**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*	**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*			Nurturer	
Contributing to society *Meeting society's needs*	**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*	**Explorative** *Following speculative leads which challenge norms*	**Stretching** *Being stretched into new areas*	Colleague	Collaborative
Drawing upon student expertise *Building from existing student abilities*			Guide	
Forming productive communities *Drawing key stakeholders together*			Colleague	

Table 2 Framework for thinking about supervision in the technology disciplines (long version)

Pedagogies Supervisors see teaching research students as	Supervisors direct attention towards	Supervisors' approaches	Sample learning outcomes	Supervisors primarily see research as	Supervisors primarily see students learning to research as	Supervisors' suggested roles	Curriculum orientations
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	
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

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						
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.

5. ELEMENTS OF THE FRAMEWORK

There are eight elements in the framework (Figure 1).

Figure 1 Elements of the framework

These elements were discovered during conversations with many supervisors. They were thinking and talking in response to the following questions:

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

What would you have said?

"I didn't realise I was so passionate about Higher Education!"

5.1 NINE PEDAGOGIES

Technology supervisors reveal nine different ways of thinking about teaching and learning in supervision (the 9 pedagogies).

These 9 pedagogies align with wider curriculum orientations identifiable in the higher education sector (see Table 3 below).

Table 3 The 9 pedagogies and related curriculum orientations

9 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 Supervisors' Development	Pursuing the supervisor's established objectives	Personal Relevance
Enabling Students' 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	

These pedagogies are described in more detail in Section 6 of this resource.

5.2 APPROACHES

There are three teaching and learning approaches that supervisors adopt when supervising (Figure 2).
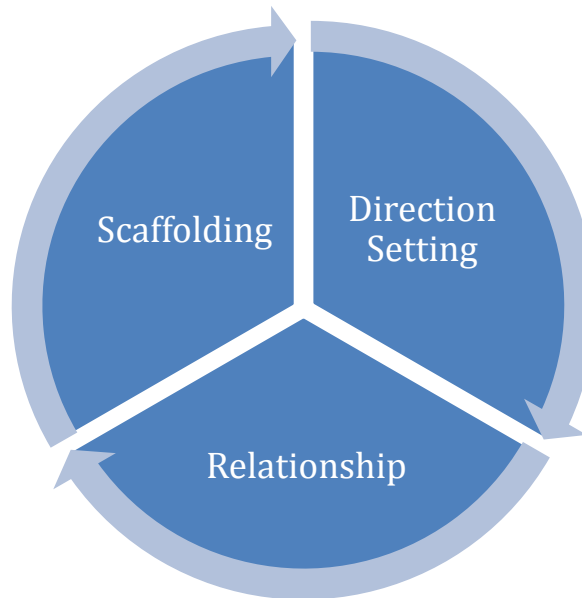
Figure 2 Approaches to supervisory pedagogy

Often we adopt a blend of these approaches.

The extent to which any one dominates could be said to reflect our personal approach, or the approach 'encouraged' by our experience of our context or environment.

We could speculate that an appropriate balance of all three is likely to result in a healthy supervisory environment

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.

We may, for example, provide structure early in the candidature by clarifying the student's role, devising a monthly plan and developing an overview of the thesis. We would ensure outputs through regular reporting, and early journal and conference writing.

Our pedagogy is likely to be associated with the detailed organisation of practical activities surrounding supervision.

"**An awareness of different approaches** provides a basis for developing a more substantial repertoire of approaches to supervision to meet the varied needs of different students at different times during their candidature"

(Brew and Peseta, 2008, p.135)

Murphy (2004), from interviews of Asian engineering supervisors and students, contributes **four orientations to supervision**:
1. controlling/task-focussed;
2. controlling/person-focussed;
3. guiding/task-focussed; and
4. guiding/person-focussed

DIRECTION SETTING

When adopting a **direction setting approach**, we emphasise research objectives.

The direction setting approach is concerned with the need to give clear guidance to students, in terms of the goals of their candidature. We may, for example, incorporate new students into our established research programmes, prompt students to assess their project objectives in the light of their workgroup context, or establish goals that we can mutually agree on.

Our pedagogy is likely to be associated with bringing about maximum advantage to achieving research goals.

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. We may, for example, establish learning communities by learning with the student, forming a substantive relationship with them, and encouraging work with other students and industry partners. We would negotiate expectations.

Our pedagogy is likely to be associated with bringing people together to further directions valued by the individual or group.

Which approaches do you currently use? Why?

…………………………………………………

…………………………………………………

Which approaches might you add to your repertoire?

…………………………………………………

…………………………………………………

"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."

5.3 STRATEGIES

As supervisors, we use a wide range of strategies. Most of these strategies can apply across the framework; others sit more comfortably in particular frames. (See Section 8 for examples of how the strategies might work when adopted by particular approaches or roles.)

STRATEGY A. CREATING GROUPS

Drawing key players together for conversation, on a regular basis, using:

- Small groups – single student (held weekly, fortnightly or monthly)
  - One supervisor and one student meet on a fortnightly basis, with the student bringing their progress on an assigned writing project.
  - One or two supervisors and one student meet on a monthly basis, with the student bringing questions that have arisen.
- Larger groups – many students (held weekly, fortnightly, monthly or annually)
  - Weekly reading groups, led by the students.
  - Monthly discussion groups where students bring questions, open to any students (not just those supervised by the academic present).
  - Monthly seminars, with many students, supervisors and industry partners, where students present short papers.
  - Annual mini-doctoral consortia, where many students present their work to a panel of supervisors.
- Groups outside the university
  - Students present peer-reviewed papers at conferences.
  - Students attend summer schools, to acquire specific skills.

> Which strategies have you used and why? Which strategies seem useful or interesting to try? How can you implement them?

STRATEGY B. CREATING STRUCTURE

Project managing or planning, with an emphasis on the process, establishing:

- early clarity about responsibilities;
- goals of the project and supervisor/student responsibilities;
- monthly plans, especially for first year students;
- project objectives for this period and associated tasks;
- early development of a Table of Contents and an Abstract;
- headings and subheadings with descriptive sentences, which are progressively expanded into full chapters;
- regular reporting, for example monthly; and
- standard forms which cover the essential aspects, then work through these in a meeting.

The first year is very important, especially the first half year, I think. So normally at the very beginning I ask the students to make a plan. I want them to control their time because we have three months before something is due. I ask them to give me a plan, month by month, and the first month week by week. (I11-2 –IT, female, experienced)

Establishing collaboration

So, in summary, it's about forming a substantive human relationship… That has to be continually refreshed and out of that there is a respect.

Some students like to meet regularly and they want to talk a lot, and others you understand that they want to go away and they don't want you to bother them.

Then there are others who might go away but they don't come back, so you have to keep checking in the early stages how they are travelling.

Some are not very introspective about what's going on or are not assertive enough at least in the early stages until you've got an established relationship which allows communication to happen. (I16)

STRATEGY C. GENERATING OUTPUTS

Ensuring timely deliverables, the outcomes aspect of project management, for example:

- representing the study as a project that has an end;
- identifying an examinable thesis as the ultimate goal;
- commencing outputs early; and
- submitting to realistic events, such as lower level conferences.

I tell them when they are even 50% happy with something or they have come to a point where they don't know what direction to take, "Give it to me" because I don't want them to try to figure it out and then find it's a completely wrong direction. So I try to see drafts and I try to see their thoughts very early before they are emotionally committed to them. (I20 – Engineering, female, experienced)

STRATEGY D. CREATING SPACE

Providing intellectual space, reducing structure to allow creativity and inspiration, for example:

- have open conversations, to help discover the possibilities;
- withhold critical comment to allow speculative thinking;
- give students the opportunity to make their own discoveries; and
- indicate the way to find the answer to a question, rather than give the answer directly.
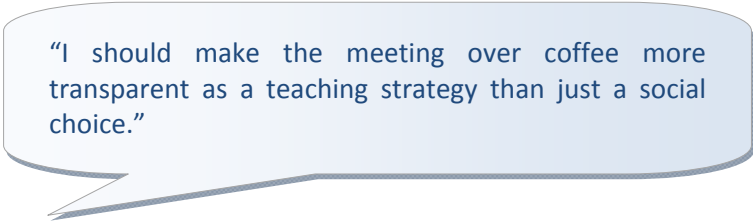
It's the esoteric thoughts that you really need in research. You need the wacky thoughts, "Why don't we try looking at it this way?" If you're not comfortable, you're only going to say things that are safe. (I13 – Engineering, male, no completions)

STRATEGY E. ESTABLISHING COLLABORATION

Forming learning communities, with the student as a colleague, for example:

- learn with the student, work side by side with them;
- learn to use a new laboratory instrument together;
- form a substantive relationship with the student;
- explore new thoughts together, through open speculative discussion, perhaps during informal lunch meetings;
- encourage collaborative work with other students; and
- situate a student in a like-minded group or in a team working on a common project.

You create a bidirectional flow whereby… this organization has a very dense network... You have all these dots, but all these dots are very well connected… there is a maximum density in this network. Every single student is another bouncing partner for all the other PhD students in that network. (I12-2 – IT, male, experienced)

"I should make the meeting over coffee more transparent as a teaching strategy than just a social choice."

Considering the students' career goals

A student has recently informed me, fairly late in the game, that they want to pursue a consulting career.

So I want to try to ensure that they have the necessary breadth and range of understanding in order that they can interact with practitioners…

not just go deep into esoteric academic topics but rather ensure that they know the means of evaluation that are used in practice and then emphasize that in the thesis.

We can ideally tailor the student's experience to some degree, in the light of their career aspirations. (I12)

STRATEGY F. FOCUSSING ON THE BIG PICTURE

Incorporating the context of the candidature, the long-term objectives, for example:

- consider the student's career goals;
- provide teaching opportunities, if student is pursuing an academic career;
- factor in the student's and supervisor's strengths and weaknesses; and
- match a student who requires significant mentoring with a supervisor who is able to offer this level of engagement.

I often have conversations with students about what they want in terms of a career and we try to somehow take that into consideration in devising their programme of activities. (I12-1 – IT, male, very experienced)

STRATEGY G. NEGOTIATING EXPECTATIONS

Setting up the programme for success, by establishing high standards, for example:

- early establishment of clear expectations;
- draw up a supervision contract, outlining university's expectations of the student, including the student's growing independence;
- only accept candidates who display a satisfactory proficiency; and
- screen applicants to choose only high quality students who are interested in the supervisor's research group's topic area.

I get people to send me some writing before I take them on so I can see their basic level. So, making sure that the students who come in are actually ready for a PhD level. (I20 – Engineering, female, experienced)

STRATEGY H. PURSUING ESTABLISHED PROGRAMMES

Contributing to previously determined research agendas, including:

- inserting students into supervisor-defined, established programmes of research; and
- placing students in established programmes, to advance those programmes' agendas.

Generally the way I do work with students is that during the first year they are probably working as a research assistant, learning the ropes. This is what you have to do, you have to do the literature review and this is the kind of program you will have to write and this is how we are going to test it, etc. (I1 - IT, male, experienced)

QUT supervisor training programs offer many more strategies. See Section 9 of this resource. In particular look for materials to help with negotiating expectations and supervision agreements on the fIRST web site.

QUT Graduate Capabilities

THINKING
- advanced theoretical knowledge and analytical skills, as well as methodological, research design and problem-solving skills in a particular research area.

RESEARCH MANAGEMENT
- independence in research planning and execution, consistent with the level of the research degree/researcher.

INFORMATION MANAGEMENT
- advanced information processing skills and knowledge of advanced information technologies and other research technologies.

ENTERPRISE
- awareness of the mechanisms for research results transfer to end-users, scholarly dissemination through publications and presentations, research policy, and research career planning.

RESEARCH CONDUCT
- competence in the execution of protocols for research health and safety, ethical conduct and intellectual property.

COMMUNICIATION
- skills in project management, teamwork, academic writing and oral communication.

5.4 LEARNING OUTCOMES

As supervisors we seek many learning outcomes from the HDR candidature. The table below presents an overview of some learning outcomes we expect of research students. The learning outcomes are shown in connection with the pedagogies that they are associated with.

Table 4 Some learning outcomes sought by supervisors

Some learning outcomes	Supervisors see teaching and learning research students as
• discipline, to be hard workers • knowledge about academia • quality publications, indicating a complete project • topic expertise • discipline expertise • approaching findings with scepticism • rigour *I would like them to become like… Isaac Newton… one of the reasons I think that he was so effective in making groundbreaking answers was that he was both very thorough and very diverse… that enabled him to… make linkages. (I2 – Engineering, male, experienced)*	**Upholding academic standards** *Meeting the discipline and institutional communities' expectations*
• how to conduct research... using my approach • how to do a literature review • what doing research means • a scientific method, how to lead an experiment and give an account in the proper way • ability to publish • how to get resources • project management • how to present succinctly • ability to write academically • how to write for different audiences • how to sell their topic • about the process of being a rigorous investigator • how to ask questions and think creatively *I expect them to learn a lot about the process of being a rigorous investigator and along the way they learn about their topic... The topic I think is almost less important in my mind. (I9 – IT, female, no completions)* *They've got to learn how to write, because if they can't write, they can't write publications, so it doesn't matter if they can do the experiments because if they can't write they're not doing research, as simple as that. (I3 – Engineering, male, very experienced)*	**Imparting academic expertise** *Conveying expertise in research processes*
• to become a devil's advocate • how to become an expert • that research is difficult… that a PhD is frustrating • reflection skills • developing study habits *They all need to learn that a PhD is frustrating, that it's a long, slow process. (I5 – Engineering, male, experienced)*	**Promoting learning to research** *Meeting students' learning needs*

QUT Graduate Capabilities

THINKING
- advanced theoretical knowledge and analytical skills, as well as methodological, research design and problem-solving skills in a particular research area.

RESEARCH MANAGEMENT
- independence in research planning and execution, consistent with the level of the research degree/researcher.

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RESEARCH CONDUCT
- competence in the execution of protocols for research health and safety, ethical conduct and intellectual property.

COMMUNCIATION
- skills in project management, teamwork, academic writing and oral communication.

Some learning outcomes	Supervisors see teaching and learning research students as
• fit into an established research team • contribute to supervisor's projects *during the first year they are probably working as a research assistant, learning the ropes… you have to do the literature review and this is the kind of program you will have to write and this is how we are going to test it… (I1 - IT, male, experienced)*	**Promoting the supervisor's development** *Pursuing the supervisor's established objectives*
• learn about themselves • develop as a person • develop a passion for research • have confidence • how to organize themselves, their thoughts • entrepreneurial and leadership skills • an independent, mature researcher in their field • ability to stand on their own and question the status quo *I'd like them to have the courage to approach things from unorthodox ways, if necessary. So, a kind of independence of thought and not being afraid to go out on a limb, but to do that responsibly. (I16 – IT, male, experienced)* *getting very deeply into an area is I think very useful for students, for them to understand better about the world in general. How much you know and how much you don't know… I think that helps grow one's understanding maybe in all spheres of life. (I19 – IT, male, very experienced)*	**Enabling student development** *Seeking students' academic and professional maturity*
• to develop substantial and innovative solutions • contribution to society through research *I do try to make sure that students are aware of the overriding consideration of trying to advance knowledge and that should be, in ethical terms, something that guides how we do research. (I19 – IT, male, very experienced)* *to create ground-breaking systems that help other people (W2)*	**Contributing to society** *Meeting society's needs*

The Graduate Capabilities are QUT's formal set of research outcomes. They are listed on the Research Student Centre website with links to appropriate training. See Section 9 of this resource.

QUT Graduate Capabilities

THINKING
- advanced theoretical knowledge and analytical skills, as well as methodological, research design and problem-solving skills in a particular research area.

RESEARCH MANAGEMENT
- independence in research planning and execution, consistent with the level of the research degree/researcher.

INFORMATION MANAGEMENT
- advanced information processing skills and knowledge of advanced information technologies and other research technologies.

ENTERPRISE
- awareness of the mechanisms for research results transfer to end-users, scholarly dissemination through publications and presentations, research policy, and research career planning.

RESEARCH CONDUCT
- competence in the execution of protocols for research health and safety, ethical conduct and intellectual property.

COMMUNCIATION
- skills in project management, teamwork, academic writing and oral communication.

Some learning outcomes	Supervisors see teaching and learning research students as
• creation of innovative systems • employ courageous, out-of-the-box thinking *learn things that are difficult and innovative, create their own very substantial solution… And… solutions to complex problems, as well, not just simple ones. (I2 – Engineering, male, experienced)*	**Venturing into unexplored territory** *Discovering the research agenda together*
• become the world expert • teach the supervisor *I expect them to come out at the end of the three year period able to run rings around me in the particular project area that they are doing. I want to learn from them and I want them to understand that I want to learn from them. (I22 – IT, male, very experienced)*	**Drawing upon student expertise** *Building from existing student abilities*
• to develop an international network • team work skills and membership in a research community • to work effectively with others • work across discipline boundaries *a student who is a couple of years in is almost taking someone under their wing, someone who is a little newer. In some ways the more experienced student is bridging the gap between you and the new student. (I14)*	**Forming productive communities** *Drawing key stakeholders together*

> 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.

The Australian Technology Network LEAP module on:

- 'Communication' may be useful in forming productive communities.
- 'Entrepreneurship' may be useful in venturing into unexplored territory.

See Section 9 of this resource.

The most influential investigation into researchers' experience of research was conducted by Brew (2001), who describes **four variations in the experience of research.**

1. In her *domino conception,* research is seen as separate tasks or events that impact on one another. These individual separate elements are the focus of researchers' attention, and need to be synthesised as part of the research process.

2. In her *trading conception,* research is seen as a social phenomenon with focus on research products such as publications and grants.

3. In her *layer conception,* researchers focus on their data and discovering the meanings embedded there.

4. In her *journey conception,* researchers are aware of themselves as researchers and the influence of their research on themselves and society.

5.5 VIEWS OF RESEARCH

As supervisors we may view research and learning to research in various ways. Our views may also influence the learning outcomes we seek.

RESEARCH IS SEEN AS SUBSTANTIAL

It is about working rigorously on difficult problems, resulting in important breakthroughs.

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.

It's an intense, full-on occupation, being a researcher. (I1 – IT, male, experienced)

It's not really just about mimicking, it's about coming up with new ideas, new and substantial ideas. So, we start talking to them about vision because you need to have a vision to get to that place where you can be a substantial researcher. (I2 – Engineering, male, experienced)

they've got to learn the rigours, that badly done research is pointless and so if they are working with an engineer and it frustrates them that they have to spend so much time designing an experiment or a technique, that they understand that that is valuable at the end of the day. If you're going to do it, you've got to do it properly. (I5 – Engineering, male, experienced)

What do you, your colleagues or your students have to say about this view?

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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.

Because we work in science so they have to learn a scientific method of research. So, trial and error, to try a certain experiment, see if the experiment is successful, if it is not successful try to find answers. (I4 – Engineering, male, experienced)

Persistence is high on the list. Not giving up too soon. Being willing to try the 401 things that didn't work, before you got to the one that does work. Being systematic, in the sense that your research is replicable by somebody else. (I14 – IT, female, experienced)

What do you, your colleagues or your students have to say about this view?

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Bowden and Marton (1998) 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).

Senior academic administrators in universities have been found to view research as being diverse but having the main attributes of:
1. the creation of new knowledge, implying building on what is already known;
2. enquiry, involving systematic and sceptical reflection on knowledge; and
3. the publication of results, including submission to peer review.

This was accompanied by the notion of scholarship which contributed a breadth of viewpoint and the sustained pursuit of a line of research (Neumann, 1993).

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.

I expect them to learn how to... how to solve problems on their own... create their own very substantial solution... and innovative solutions... solutions to complex problems (I2 – Engineering, male, experienced)

I expect them to learn how to think, to critically analyse the problem, to come up with a variety of solutions, and to narrow that down. (I13 – Engineering, male, no completions)

What do you, your colleagues or your students have to say about this view?

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RESEARCH IS SEEN AS DEEPENING

It is about increasing self awareness through an iterative process.

Some key ideas associated with this view are: Iterative, narrowing focus, deepening self, understanding your own contribution.

To work their way into the topic and to identify what they think are the key issues that they need to resolve (I3 – Engineering, male, very experienced)

They… learn about themselves… it's an exercise in discipline, it's an exercise in organisation, it's an exercise in hard work and frustration… research is difficult… and never is as simple as it looks. (I5 – Engineering, male, experienced)

The students have to sort of embody this themselves… there is a guidance… modulated by the student and their strengths and weaknesses… providing them with enough so that they can start an internal process whereby they start manifesting themselves. It's not an externally driven sort of thing… you walk together and then suddenly it's like they hit a gear and then they start going off doing things and finding that they have the confidence to do that. They sort of launch off. (I16 – IT, male, experienced)

What do you, your colleagues or your students have to say about this view?

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Kiley and Mullins (2005) found that research supervisors view research as :

- technical;
- applying systematic techniques;
- creative and innovative;
- integrating complexity;
- synthesising complex data or knowledge; or
- bringing about new ways of seeing.

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.

Doing research… means publishing research outcomes. (I3 – Engineering, male, very experienced)

Some of them have industry sponsors either sponsoring research or as a source of evidence for the research and I basically said to them, "It is your responsibility to ensure that this sponsor organization gets value for what you are doing." (I12-1 – IT, male, very experienced)

The overriding consideration of trying to advance knowledge… should be, in ethical terms, something that guides how we do research. (I19 – IT, male, very experienced)

What do you, your colleagues or your students have to say about this view?

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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.

To have the courage to approach things from unorthodox ways… So, a kind of independence of thought and not being afraid to go out on a limb, but to do that responsibly. Of course… you become part of a field and that field has its own norms but still to be aware that you are not to be trapped by that. (I16 – IT, male, experienced)

The nature of the research that we do is that we have to be somewhat reactive according to what happens. We may try to solve a particular problem but it may not come out as we expect… depending on how it develops we might say, "This is really promising we'll go further with this and push the rest of the plan aside accordingly." (I19 – IT, male, very experienced)

What do you, your colleagues or your students have to say about this view?

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"This makes you realize you've got to think of new ways of doing things."

5.6 VIEWS OF LEARNING TO RESEARCH

Students (women in Australia and South Africa) see research as:

- *the gathering of information*, including the collection of data for analysis;
- *discovering truth,* seeking out the truth or establishing the truth about something;
- *an insightful process,* deepening or extending our understanding of existing knowledge;
- *re-search,* returning to previous research and making new findings; and
- *finding solutions to problems*, or answering questions

(Meyer, Shanahan & Laugksch, 2005)

LEARNING TO RESEARCH IS SEEN AS ACCEPTING CONSTRAINTS

It is about 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.

You have to learn a number of techniques depending on the field you are working in and you have to master these techniques in order to give a result that is at an international level (I4 – Engineering, male, experienced)

What do you, your colleagues or your students have to say about this view?

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LEARNING TO RESEARCH IS SEEN AS BEING APPRENTICED

It is about 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.

The preferred model for me is master/apprentice, when you're at the coalface together and working on the details together. (I16 – IT, male, experienced)

I guess it is the master-apprentice approach, where you basically teach them how you do it. (I1 – IT, male, experienced)

The ATN LEAP modules on 'Entrepreneurship' and 'Research Commercialisation' may be useful resources for seeing research as productive.

The QIPS - Supervisor Solutions module on 'What is Good Supervision?' talks about mentoring and learning to see research as an apprenticeship.

Students report that learning to research involves:

- recognising alternative epistemological stances;
- seeking to understand the basis of others' perspectives;
- realizing differences in the fundamental nature of learning;
- engaging in personal reflection and appreciating its role in interpretation; and
- understanding and realizing differences in the nature of professional practice

(Wood, 2006)

LEARNING TO RESEARCH IS SEEN AS JOURNEYING

It is about 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.

They have to learn about themselves that they can take a subject, understand it and develop it and learn a level of independence (I5 – Engineering, male, experienced)

I expect a PhD student to be a little bit more self-directed and prepared to learn the method. They have a little more time… to complete the work, so let them learn by trial and error. (I8 – IT, female, experienced)

There's a big difference between the beginning and the end of the PhD… I expect them to take more and more responsibility as they go along. By the time they get to the end it is really being done mainly by themselves… by the end the student should be functioning like we do as colleagues. (I20 – Engineering, female, experienced)

What do you, your colleagues or your students have to say about this view?

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LEARNING TO RESEARCH IS SEEN AS FOCUSSING

It is about pursuing mature, world-class expertise.

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'.

Something I've said to students for many years now is that they should be the world's foremost authority in the narrow area of their research by the time they complete. (I12-1 – IT, male, very experienced)

I think it's got to do with if the student has really found a question that they are passionate about, that they have got a lot of energy for… I have actually seen things… go in directions that I didn't expect, and in fact didn't even agree with… if I have a feeling that it academically or intellectually passes muster, then I allow them to take it in that direction. (I16 – IT, male, experienced)

What do you, your colleagues or your students have to say about this view?

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To what extent do we wish research students to adopt the views of their academic counterparts?
(Bruce, Stoodley and Pham, 2009)

LEARNING TO RESEARCH IS SEEN AS CONTRIBUTING

It is about exploring positive impact on others.

Some key ideas associated with this view are: Coming to understand the impact of research on society.

To create ground-breaking systems that help other people. (W2)

the ability to reflect very effectively, on their processes to improve them, to be able to contribute better to society. (I2 – Engineering, male, experienced)

What do you, your colleagues or your students have to say about this view?

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LEARNING TO RESEARCH IS SEEN AS STRETCHING

It is about being stretched into new areas.

Some key ideas associated with this view are: Expanding into new areas, big changes, cutting edge.

It's the esoteric thoughts that you really need in research. You need the wacky thoughts, "Why don't we try looking at it this way?" If you're not comfortable, you're only going to say things that are safe. If you are going to bother doing research, you may as well not make it incremental. (I13 – Engineering, male, no completions)

It's nice to build on people's strengths but is it really developing them in the best way? Is it stretching them? ... With the very good student our relationship was such that we could talk about half formed ideas and as you were talking about them you could clarify something together. Whereas, if it's a student that is not up to that level, if you have a half formed idea and you start talking about it you probably just confuse them and they end up thinking that you don't know what you're talking about. Whereas, for a student who is more experienced to be talking about something that's half baked is probably exciting because it means that you really are close to that cutting edge where you're still forming things. (I14 – IT, female, experienced)

What do you, your colleagues or your students have to say about this view?

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Murphy (2004) found that **supervisors' perspectives on supervision combine two sets of qualifiers**:

1. a tendency towards controlling (supervisor-driven, candidate is shaped, transmission of information to candidate, supervisor-motivated, supervisor as expert) or guiding (collaborative, negotiated project direction, candidate is enabled, mutual responsibility, candidate self-motivated) beliefs; and

2. a tendency to be task-focussed (results focus, controlled atomistically, student as employee, career goals, extrinsic rewards) or person-focussed (becoming an expert, student growth, holistic, mutuality, rewards intrinsic).

5.7 SUPERVISORY ROLES

As supervisors we see ourselves as filling different roles.

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

THREE TYPES OF SUPERVISORY ROLES

Table 5 Types of supervisory roles

Types of roles	Examples
Directing The directing roles emphasise the supervisor's input into the candidacy.	• Manager • Director
Collaborative The collaborative roles emphasise supervisors working with students as equals.	• Partner • Colleague
Responsive The responsive roles emphasise meeting students' needs. They are adopted as required throughout the candidature.	• Mentor • Coach

More examples of roles belonging to these groups appear on the next page.

The QIPS - Supervisor Solutions module 'What is Good Supervision?' discusses the roles of the supervisor.

See Section 9 of this Resource.

I distinguish between my role at the beginning of a candidacy and my role towards the end. I expect that my role will change from a more directing one at the beginning to a more collaborative one as the journey continues. What about you?

About Directing

The first year is very important, especially the first half year, I think. So normally at the very beginning I ask the students to make a plan. I want them to control their time because we have three months before something is due. I ask them to give me a plan, month by month, and the first month week by week. The first month is normally the literature review. They give me the list of what they are reading and I give them some papers. I control what they are reading to make sure they are on the right track. (I11)

About Collaborating

I usually say to students when we start out that I see this as a shared journey, and that it's a destination I've not been to before and so I can't lead them or guide them in some sense on the journey because I haven't been there either, in terms of that particular area of research that we are trying to find the answer to. Based on my own experience of research, I like to think that I'm "wise to the ways of the forest", so I guide them in that spirit but I've not been to this particular destination either. (I6)

EXAMPLES OF THE DIFFERENT ROLES

DIRECTING ROLES

MANAGER – ensures milestones are met, quality is high and students' expectations are moulded.

Being clear about milestones… So, reports are submitted, deadlines are met, progress is sufficient and if it's not to initiate the appropriate action… it's important that students do not spend too much time on areas that are not going to be productive for the PhD. (I9 – IT, female, no completions)

The manager is the person who can really make sure that that program will end, the candidate will do the thesis and will graduate. (I22 – IT, male, very experienced)

DIRECTOR – points the student in the right direction, indicates the source of answers to their questions and provides early intellectual content.

it's a lot about helping them find a project and setting a realistic goal... It's very much at the front working through the particular pathway (I5 – Engineering, male, experienced)

It's not answering the questions for them. It's pointing them in the right direction… It's being wise to the ways of the forest rather than having the answer myself (I6 – IT, female, experienced)

COLLABORATIVE ROLES

PARTNER – adopts a position as a fellow-learner alongside the student, forming a research team.

It's a research partnership, it's not a student-teacher relationship in the same way it is as an undergraduate student. I've learned an awful lot from PhD students and from Masters students. (I8 – IT, female, experienced)

COLLEAGUE – treats the student as an equal academic, with high expectations of the student as a significant contributor to the project.

It's great to have someone skilled because it means they can work semi-independently and get a lot of research done. Your relationship is starting off a lot more as colleagues than as supervisor and student. (I14 – IT, female, experienced)

RESPONSIVE ROLES

COACH – involvement in the project at a high (visionary and planning) level only.

The role of the coach should be to help the coachee's thinking rather than to solve problems for the coachee. (W2)

MASTER– orienting the student to the profession.

I actually have a responsibility which is more than just the research and the production of the thesis. I think I have a responsibility to try to do general professional development… The PhD is one of the few areas of life where we still have the masterpiece… your thesis is going to the examiners, the existing Masters, who judge it to see if you should be admitted to their ranks. (I5 – IT, female, experienced)

I want to make sure that they're ready, so that when they get out there they are not green and when they get out there the big bad world doesn't scare them too much. (I17 – Engineering, male, experienced)

MENTOR – instilling the 'spirit of the discipline' and developing their colleagues.

As mentor you are going to build that person to become a true research professional in the discipline that they have chosen. So, your job is to instil in them the spirit of the discipline. I have a test -- when they have gone to the bikkies and drinks at the graduation ceremony… Would you say, "That person is really my colleague, they are not my student any more but now my colleague"? That's what I call a mentoring role. (I22 – IT, male, very experienced)

I don't think it is necessarily teaching them specific skills because they know a lot of that stuff already. It's more as a guide or mentor, to challenge them and support them, to take them to the next level. I see it more as a collegial relationship and just giving them a lot of feedback and support. (I20 – Engineering, female, experienced)

ADVISOR – answering questions raised by the student.

I like the American term "adviser". Obviously there is a lot of experience that I've got as a researcher, to guide and advise them and help them understand how the research community works. (I19 – IT, male, very experienced)

EXAMPLE – modelling to the student how research may be done.

I do not pretend that I am going to teach them every possible way of research, rather because I consider myself quite a successful researcher I believe that the way I do it works and therefore I try to teach it the way that it can be done. A good way of doing it... (I1 - IT, male, experienced)

NETWORKER –supplying contacts and a breadth of resources.

Give them initial contacts, people to talk to. (I3 – Engineering, male, very experienced)

To see the dots, to bring the dots together. If someone sits in my room and says, "I am currently facing this situation."…We try to open these doors. We understand that the student doesn't have this kind of network and we want to find the best case for their scenario. . It's facilitating the journey and providing access to people, to organizations, to empirical evidence. (I12-2 – IT, male, experienced)

PRESALES CONSULTANT – looking for the next opening in the discipline.

I feel like I'm a presales consultant, you go and chase the next topic, maybe big brain, what is the next wave. (I12-2 – IT, male, experienced)

SUPPORTER – encouraging, providing damage control at crisis points.

I like them to take ownership of their thesis and so I do a lot of supporting so they can own the thesis, that they can own their work, but it also means that I do not take responsibility when they don't meet deadlines. If they choose not to make the deadline, then they accept the consequences from that. It doesn't mean that I berate them, I help them to recreate the deadline, but they know that it has consequences on their other timeframes that they have made. So, I am pretty clear that it is their thesis and it is their journey and I am their number one supporter but it is theirs. (I20 – Engineering, female, experienced)

EDITOR – providing proofreading and argument advice.

Editing is still there… in the early stages of the work and suggesting improvements, but not telling them how to write because everyone has their own personal writing style. However, I'm now finding with the international students that this is a very blurred line. I'm finding sentences that make no sense and I'm having to figure out what the students are trying to say and making suggestions. (I8 – IT, female, experienced)

NURTURER – discovering and building on the student's interests and abilities.

It's not about having rules about what I do, it's about trying to meet the needs of each student. (I9 – IT, female, no completions)

For the students often it's a matter of finding what they are able to do easily and what they are able to do with a certain effort and what they are completely unable to do. … So, you have to lead them along a certain path and find out their skills, because they arrive with certain skills and you have to build on these skills, rather than building everything from scratch, because that is difficult in the time span that you have. (I4 – Engineering, male, experienced)

CUSTODIAN – monitoring their content knowledge.

I feel like I'm a custodian for the content but not for the bureaucratic process (I16 – IT, male, experienced)

QUALITY ASSURER – ensuring they come up to expected academic standards.

Every now and then I have to add some intellectual content, … trying to ascertain if what they've done has actually been reasonable, that the ideas they've developed actually have a good, sound physical basis, or a mathematical basis, that the experiments have actually been done reasonably and that they've actually used shielded cables and they haven't just seen noise in the measurements and things like that. (I3 – Engineering, male, very experienced)

COUNSELLOR – helping the student maintain motivation.

Pressure can be effective but it can also be counter-productive. …so there has to be a lot of motivation in there as well, a building of motivation in conjunction with deadlines. (I12-1 – IT, male, very experienced)

We tried to pick topics of interest to industry where we wanted some momentum. We wanted the students from day one to think it was the best thing since sliced bread that they're working on. I tend to say that to every single student, "This is the most important topic in our field." This is a kind of feel-good factor. (I12-2 – IT, male, experienced)

INTERMEDIARY – liaising between the student and university systems.

We've got one with IP issues at the moment, so we're all learning as we go. In that particular case I believe I'm an intermediary between the student who is externally funded and the university… So, you've got to be a bit of an advocate for the student but you also have to make sure that you are doing things within guidelines. (I17 – Engineering, male, experienced)

PARENT – keeping an eye on the students' personal needs.

It's almost a parenting role to make sure they're happy, and if you can look human to them then they're more likely to come and tell you their problems. (I5 – Engineering, male, experienced)

I also tend to be a bit of a mother as well. I will offer personal advice where one is aware that there is a girlfriend crisis... I might be old-fashioned but where there's a student in front of you in tears because his girlfriend has left him, you've got to give him a hug and you've got to just be mother. (I5 – IT, female, experienced)

Some students are really quite stubborn. What you need to do then is almost like a parent and explain that you really need to do some things that you don't really like. (I16 – IT, male, experienced)

FRIEND – providing for social needs.

I like to be friends with my students, if I can help them with issues that they have and leave it at the level they want to leave it at. Some students like to talk to me more about their personal situations and some don't and so it's whatever they want to do… Sometimes it can be a concern, how students are doing, especially if they have come from overseas or from outside town. So I try to make sure that they are in with a community here. (I19 – IT, male, very experienced)

SAFARI LEADER – supporting the student as they branch out.

one of your roles is that guidance -- the safari leader. There are all sorts of distractions along the way and that's up to your judgement… Some theses you just guide all the way through but most do strike off on their own, particularly half way through or towards the end of the second year. Then you just wait to see what you're going to get, really. (I21 – IT, male, experienced)

What do you, your colleagues or your students have to say about this view?

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Neumann (2007) observes that **government policy about research funding and the increasingly constrained economic climate exert considerable influence over doctoral studies in Australia.** Doctoral studies in engineering are typically tied directly to practice and funding capacity, so students are given the topic rather than choose it. Safe topics are preferred, which require minimum supervision and promise completion. Students are also selected according to their capacity to complete rapidly, thus full-time, English-speaking, local students are preferred.

5.8 ENVIRONMENT

Our supervisory environment influences supervisory pedagogy, helping or hindering supervisors in their roles.

HELPS TO THE SUPERVISORY PROCESS

Important helps to the supervisory process are people and culture, resources, and synergies.

Table 6 Helps to the supervisory process

Types of helps	*Examples*
People and culture Diverse cultures makes the supervision experience enriching. Students bring a wealth of insights which stimulate supervisors to think differently about their area. Fellow supervisors contribute, thus providing a more complete experience for the student.	• Colleagues, co-supervisors, mentors • Student motivation, interests and abilities
Resources The university administration, learning support, librarians and case officers all help the students. The library, desk space and group areas are important physical resources.	• University administrative support • seminars and workshops on research topics • seminars and workshops on research processes
Synergies A student peer networks in related areas of study provide a diversity of input into the students' work.	• A peer network of students in similar fields

For example, when you make an order if all the administration is easy going and it's easy to get the order done quickly, it's very important because sometimes you need a new instrument or you need a new part and if you can get it quickly and without effort it is something that helps you. (I4 – Engineering, male, experienced)

Trying to find an associate supervisor that matches the needs of the student's project, the expertise and the need, that's complementary to what I'm missing, to provide the student with some advisors, whether that's an expert who is in industry or whether that's an expert who is a fellow academic. (I8 – IT, female, experienced)

I think where they are physically placed is quite important and influences how the interaction goes. Having the students on the same floor as my office is quite important. (I19 – IT, male, very experienced)

I think having genuine time for the students is the main thing. I know some people have 12 students and I could not do that, even if I didn't teach and didn't research. (I20 – Engineering, female, experienced)

BARRIERS TO THE SUPERVISORY PROCESS

Notable barriers to the supervisory process are also associated with people and culture, resources, and synergies.

Table 7 Barriers to the supervisory process

Types of barriers	Examples
People and culture Challenges include the students' academic level at commencement, language barriers and role expectations. Colleagues may not help the candidate. Technical support may not be up to the level desired. Faculty factions may be pursuing their own agendas.	• Poor student quality • Language barriers
Resources Inefficient administrative procedures, inadequate facilities, inadequate screening of candidates, inconsistent workload allocation, unrealistic demands and insufficient supervisor training may all hamper the supervision process. Strict deadlines and insufficient funding can limit the scope of the candidacy.	• Lack of finances • Lack of time
Synergies Low numbers of students working on similar topics offer limited opportunity for group work.	• Low student numbers prevent synergy

What also helps, of course, are resources. This is also what impedes us because we don't really have control in the faculty over the budget. Everything you need, you've got to put your hand out. You can't go and order stuff. You can't prioritise how the research budget will be spent. I would like to see a bottom-line budget that the supervisor manages, so the supervisor can decide which conferences, if at all, should be attempted. (I1 - IT, male, experienced)

It's a big enough group that there are schisms in it, so you get individuals asking questions that are probably not appropriate for students and belittling them. And you think, "Well, none of this is helpful." (I13 – Engineering, male, no completions)

I would love to supervise my students in a much more hands-on way, but I just can't. We get something like thirty five minutes a week, it's some ridiculous thing. There's so much pressure on us as academics to do a lot of other stuff, but I do the best I can. (I7 – IT, female, no completions)

Our workload allocation is a pain -- if you have one student you get the same number of half days per year as you do if you have five students. If you go to six, it jumps up. And then it stays the same until you get to nine or ten... So, in practice the allocation does not work. There is no demarcation between the principal and associate supervision and no difference according to the percentage of supervision. (I18 – Engineering, female, no completions)

The QIPS - Supervisor Solutions site module 'Cracking the Whip' discusses procrastination and student motivation.

See Section 9 of this Resource.

6. NINE PEDAGOGIES

As supervisors we think about teaching and learning in supervision in nine distinct and related ways. These views are described in this resource as the 9 pedagogies. Each pedagogy represents one of the 'rows' in the framework presented earlier (Section 4).

These nine ways of thinking exert an influence across the approaches and strategies described in the preceding parts of this resource, which is why we have called them 'pedagogies'. Each way of thinking may be associated with particular approaches, roles, and ways of thinking about research and learning to research.

Our views may be mapped (Table 8) against dimensions of teaching and learning (the columns) and a widening focus on who is involved with the candidature (the rows).

> Many of us adopt more than one of the ways of thinking presented here. Of particular interest are those ways which dominate our thinking and exploration of the implications of adopting alternative or previously unfamiliar ways.

Table 8 Supervisors' ways of thinking about teaching in the research context

Focus	Content	Supervisor's intention	Supervisor's 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

READING THE TABLE

'Content' refers to what supervisors see as the substance of the material to be imparted to the student;

'Intention' refers to the supervisor's motivation behind imparting that content; and

'Strategy' refers to how supervisors engage students with the content.

READING THE DESCRIPTIONS

These ways of thinking about teaching in the research context are described further below. Each description contains:

- Those things which supervisor's attention is directed towards (**Focus**).
- Those things which are considered relevant to supervision (**Context**).
- Those things which are considered less relevant to supervision (**Periphery**).
- The viewpoint from which supervision is seen (**Perspective**).
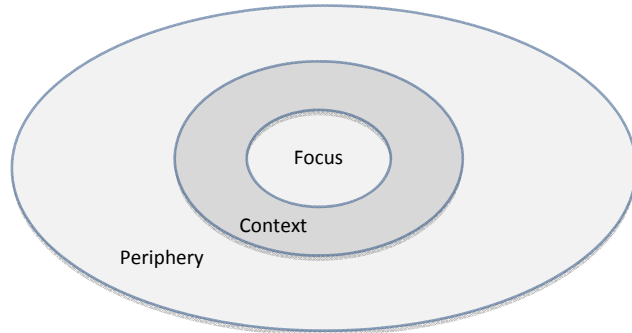
Figure 3 Sample category figure

Each way of thinking is represented diagrammatically, as concentric ovals. The focus is in the centre, the context in the next oval out and the periphery in the widest oval.

If you were to put together some thoughts about your present views (or pedagogies), what might they look like?

What do you direct your attention towards?

………………………………………………………………………………..

What do you consider to be relevant to your supervision?

……………………………………………………………………………….

What do you consider to be less relevant to your supervision?

………………………………………………………………………………

UPHOLDING ACADEMIC STANDARDS

Teaching research students is thought of as upholding academic standards. Supervisors ensure the expectations of the academic community (discipline and institutional) are met, concerning the standard of work produced and the time within which it is produced.

Something I've said to students for many years now is that they should be the world's foremost authority in the narrow area of their research by the time they complete… If they are going to be rigorous enough and deep enough, then they have to be relatively narrow and it's not a stretch to assume that they will be the world's foremost authority in that narrow area. (I12-1 – IT, male, very experienced)

The first six months I spend quite a lot of time… doing all the usual boring things, the Confirmation, etc. (I22 – IT, male, very experienced)

Supervisors –

- **Direct attention towards:** established academic standards.
- **Consider the following aspects relevant to supervision:** MOPP; graduate capabilities; external examiners; timelines; thesis as a deliverable; journals; conferences.
- **Are less likely to consider:** Students and others.
- **See supervision from:** the supervisor's perspective.
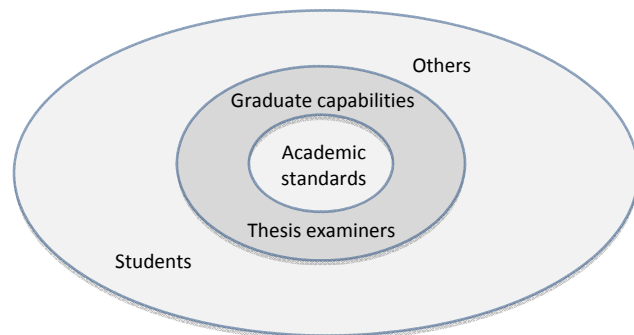
Figure 4 Upholding academic standards

PROMOTING LEARNING TO RESEARCH

Teaching research students is thought of as promoting learning to research. Supervisors perceive and respond to the needs of the student, to enable the student to reach the end goal of their candidacy.

As they say, "Every child is different", so every student is different. So, each one is a new learning in how to do it… I try to work in detail with the students. (I16 – IT, male, experienced)

There's a big difference between the beginning and the end of the PhD. They should be independent, functioning PhDs at the end... By the time they get to the end it is really being done mainly by themselves. (I20 – Engineering, female, experienced)

Supervisors –

- **Direct attention towards:** students' learning needs.
- **Consider the following aspects relevant to supervision:** Student's mental, physical and emotional well-being; institutional support structures.
- **Are less likely to consider:** Others beyond the student.
- **See supervision from:** the student's perspective.
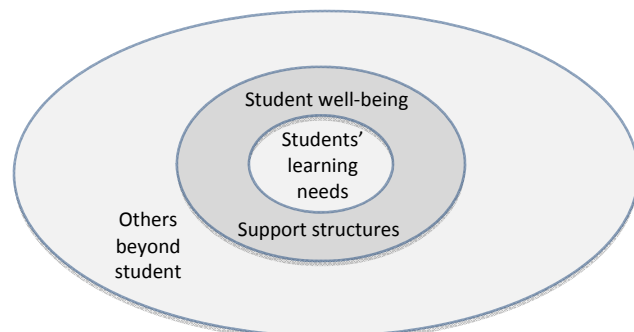
Figure 5 Promoting learning to research

VENTURING INTO UNEXPLORED TERRITORY

Teaching research students is thought of as venturing into unexplored territory. Supervisors form a research team whose members work together to discover the research agenda.

I expect them to learn about how to ask questions and think in a creative and expansive way that is not limited by what other people have said or done. (I9 – IT, female, no completions)

It's the esoteric thoughts that you really need in research. You need the wacky thoughts, "Why don't we try looking at it this way?"... If you are going to bother doing research, you may as well not make it incremental. (I13 – Engineering, male, no completions)

Supervisors –

- **Direct attention towards:** new frontiers.
- **Consider the following aspects relevant to supervision:** team inter-relations; team's strengths and weaknesses; new insights; non-standard approaches.
- **Are less likely to consider:** societal needs.
- **See supervision from:** the academic community's perspective.
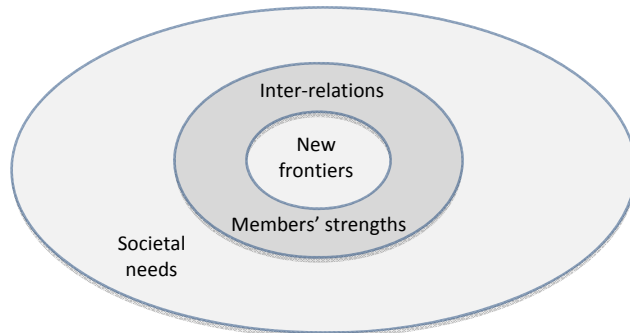
Figure 6 Venturing into unexplored territory

PROMOTING THE SUPERVISOR'S DEVELOPMENT

Teaching research students is thought of as promoting the supervisor's development. Supervisors pursue their established research objectives, determined by their personal and their team agendas.

generally the way I do work with students is that during the first year they are probably working as a research assistant, learning the ropes. This is what you have to do, you have to do the literature review and this is the kind of program you will have to write and this is how we are going to test it, etc. (I1 - IT, male, experienced)

I don't like the research assistant model… where I have ownership over the project and I tell them to go and do a certain analysis, to write up and then I clean it up myself… I like them to call some of the shots. (I17 – Engineering, male, experienced)

Supervisors –

- **Direct attention towards:** supervisor's research agenda.
- **Consider the following aspects relevant to supervision:** established agendas; existing network, in order to simplify supervision; leveraging past work; personal survival; hierarchy's expectations of supervisory load.
- **Are less likely to consider:** students and society.
- **See supervision from:** the supervisor's perspective.
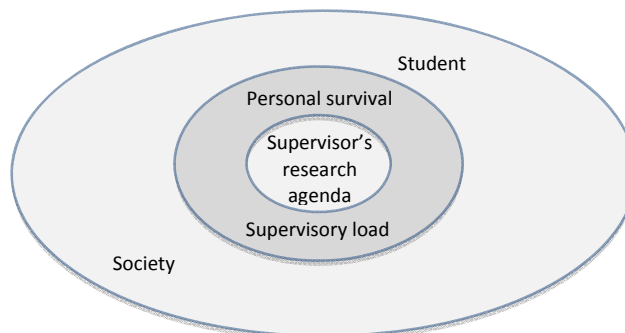
Figure 7 Promoting the supervisor's development

ENABLING STUDENT DEVELOPMENT

Teaching research students is thought of as enabling student development. Supervisors work towards student growth into academic and professional maturity.

Basically, an independent researcher so they can do all the things that they need to do. They can do their lit review, come up with a variety of solutions and then work on it. So, they will develop a level of independence. (I13 – Engineering, male, no completions)

one day they'll be known as 'Doctor Somebody' and… I still think that society tends to look at it in some certain way. They need to think about what this means socially and ethically to them. (I22 – IT, male, very experienced)

Supervisors –

- **Direct attention towards:** student maturity.
- **Consider the following aspects relevant to supervision:** student weaknesses and strengths; student ambitions and interests; student potential.
- **Are less likely to consider:** societal needs.
- **See supervision from:** the student's perspective.
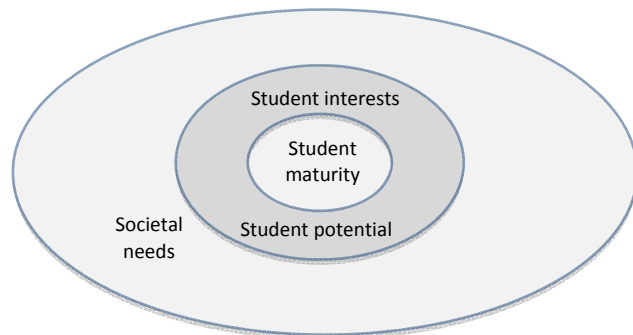
Figure 8 Enabling student development

CONTRIBUTING TO SOCIETY

Teaching research students is thought of as contributing to society. Supervisors define research in terms of society's needs and work towards having positive social impact.

To create ground-breaking systems that help other people. (W2)

the ability to reflect very effectively, on their processes to improve them, to be able to contribute better to society. (I2 – Engineering, male, experienced)

Supervisors –

- **Direct attention towards:** society's needs.
- **Consider the following aspects relevant to supervision:** contribution to society; meeting others' needs; responsible scholarship; relevance to industry; potential to commercialise.
- **Are less likely to consider:** personal and student goals.
- **See supervision from:** the wider community's perspective.
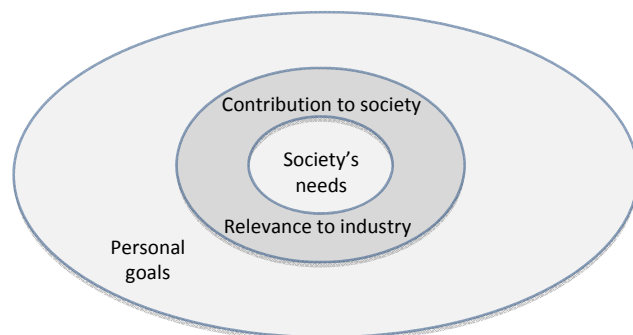
Figure 9 Contributing to society

IMPARTING ACADEMIC EXPERTISE

Teaching research students is thought of as imparting academic expertise. Supervisors convey their expertise in the knowledge and skills needed for research.

What I expect them to learn... is how to conduct research... using my approach… because I consider myself quite a successful researcher I believe that the way I do it works. (I1 - IT, male, experienced)

my approach is to lead the student to a path that they find successful by using, as much as possible, my experience on one side and their desire to succeed on the other side. I mean, I always give to the students a certain basis of what I know. (I4 – Engineering, male, experienced)

Supervisors –

- **Direct attention towards:** supervisor's knowledge and skills.
- **Consider the following aspects relevant to supervision:** supervisor's area of interest and expertise; institution's facilities; control over the candidacy.
- **Are less likely to consider:** student and community goals.
- **See supervision from:** the supervisor's perspective.
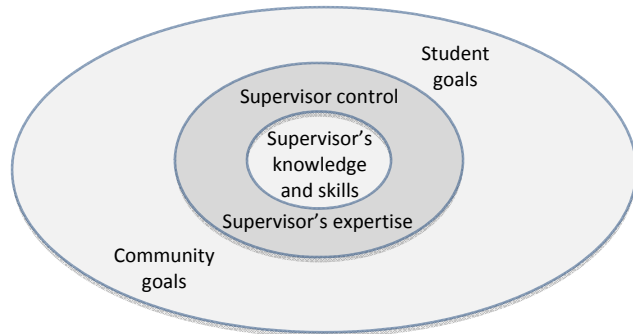
Figure 10 Imparting academic expertise

DRAWING UPON STUDENT EXPERTISE

Teaching research students is thought of as drawing upon student expertise. Supervisors build from existing student abilities and interests in order to pursue a mutually defined question.

the most important thing I think is to actually get the student to work their way into the topic and to identify what they think are the key issues that they need to resolve. (I3 – Engineering, male, very experienced)

It's a research partnership… I've learned an awful lot from PhD students and from Masters students. Some of the suggestions you hear… are excellent. So, I learn a lot from the students themselves. (I8 – IT, female, experienced)

Supervisors –

- **Direct attention towards:** student's contribution.
- **Consider the following aspects relevant to supervision:** student interests and expertise; student insights; student as a source of knowledge; student control.
- **Are less likely to consider:** community goals.
- **See supervision from:** the student's perspective.
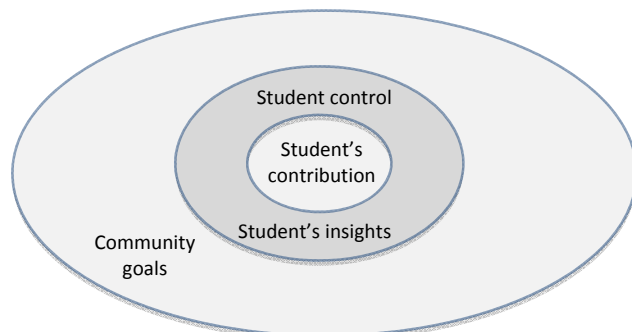
Figure 11 Employing student expertise

FORMING PRODUCTIVE COMMUNITIES

Teaching research students is thought of as forming productive communities. Supervisors draw key stakeholders together into an active network of contributors to the research endeavour.

you create a bidirectional flow whereby you have a team or this organization has a very dense network in itself. You have all these dots, but all these dots are very well connected. I want that there is a maximum density in this network. (I12-2 – IT, male, experienced)

Invite students to meet with industry partners (W1)

Supervisors –

- **Direct attention towards:** community's contribution.
- **Consider the following aspects relevant to supervision:** networks (of students, supervisors and industry partners) in order to introduce alternative points of view; multiple interactions; communication; exploration of possibilities; relinquishment of central control.
- **Are less likely to consider:** supervisor's goals.
- **See supervision from:** the research community's perspective.
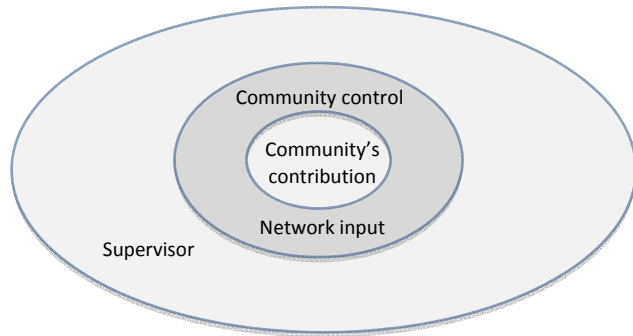
Figure 12 Forming productive communities

7. CURRICULUM ORIENTATIONS

In Tables 1 and 2, each row of the framework is associated with a curriculum orientation. Each of these may be summarised as follows:

The **academic discipline orientation** emphasises discipline expertise, with the student increasing knowledge or discovering truth. In this frame teaching research students is thought of as:

- upholding academic standards; or
- fulfilling institutional requirements.

The **competency orientation** emphasises learning research techniques, with the student applying systematic procedures to new areas of investigation. In this frame teaching research students is thought of as:

- imparting academic expertise; or
- providing a model of successful research.

The **learning to learn orientation** emphasises learning to make meaning, solve problems and create new ideas, with the student synthesising complex knowledge. In this frame teaching research students is thought of as:

- promoting learning to research; or
- developing study habits.

The **personal relevance orientation** emphasises the location of self in the research process, with the student embarking on a journey towards personal understanding. In this frame teaching research students is thought of as:

- promoting the supervisor's development; or
- enabling student development.

The **social impact orientation** emphasises the impact of research on society, with the student pursuing benefit to society. In this frame teaching research students is thought of as:

- meeting society's needs; or
- developing substantial solutions to human problems

The **collaborative orientation** emphasises research as a community activity discovering new views of the research object or territory, with the student coming to see differently and contributing to the team. In this frame teaching research students is thought of as:

- venturing into unexplored territory;
- employing student expertise; or
- forming productive communities.

8. INTERRELATING ELEMENTS OF THE FRAMEWORK

Key elements of the framework may be interrelated, suggesting that different roles, approaches and perspectives work together in different combinations to influence our supervisory practices.

Three aspects of the contributing elements may be represented together as in Figure 13:

- the supervisory approach on the horizontal axis (scaffolding, relationship and direction-setting, Section 5.2);
- supervisory role on the vertical axis (directing, responsive and collaborative, Section 5.7); and
- supervisory perspective on the third axis (supervisor, student and community, Section 6).
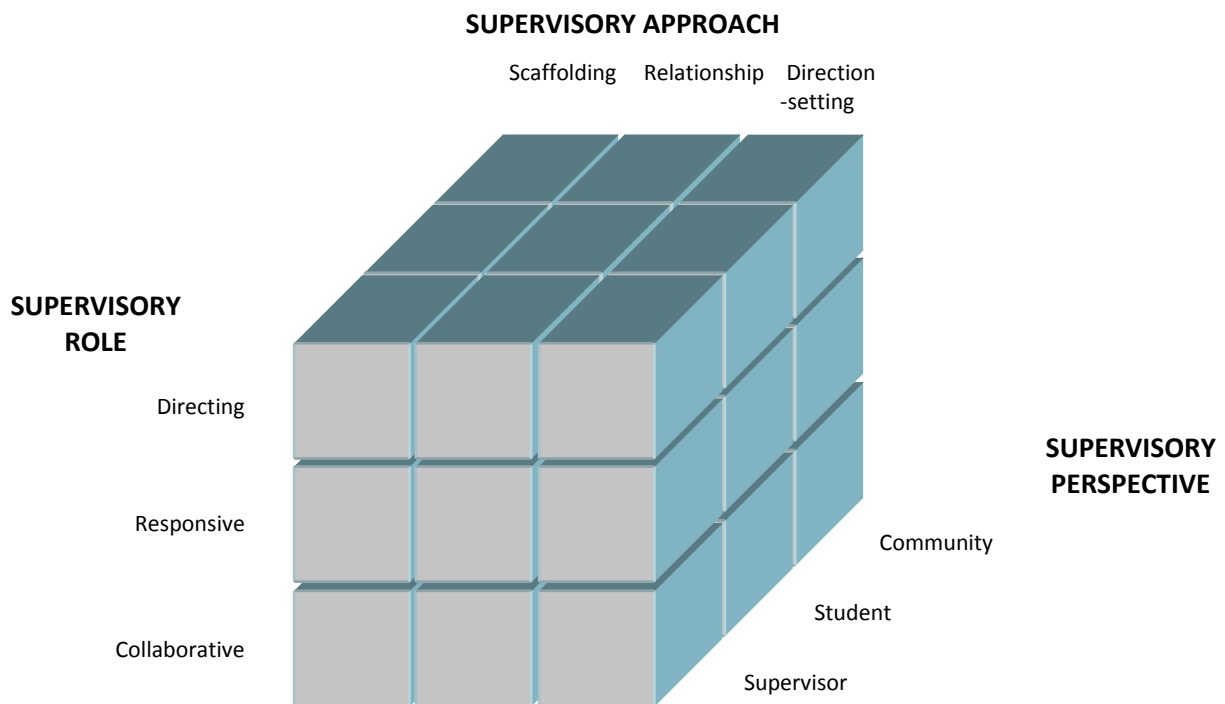
Figure 13 Interrelationship of some elements contributing to supervision pedagogy

Everything can map against everything else – some examples appear on the following pages of how some elements map against each other.

Wasburn (2002) identified **the need for a supportive community** as key to the completion of doctoral studies. The development of a Research Support Group as a learning community is described and its benefits to members are listed.

MAPPING FRAMEWORK ELEMENTS

In this section we show examples of the different practices which might occur if aspects of the framework are mapped against supervisory roles.

The relationship between elements of the framework can be mapped in many ways, including:

- types of groups mapped against supervisory roles;
- approaches mapped against supervisory roles;
- strategies mapped against supervisory roles; and
- learning outcomes mapped against supervisory roles.

You may like to consider mapping elements of the framework that interest you below and thinking about what practices might result.

Use the examples on the following pages to assist you.

Choose your own elements for the columns and rows.

Table 9 Your personal mapping of elements

"It's good to have time to reflect and consider new approaches and ideas."

TYPES OF GROUPS MAPPED AGAINST SUPERVISORY ROLES

What might happen when particular supervisory roles are adopted in different types of group supervision settings? Examples of some practices which may result are shown in Table 10. In Table 10 the horizontal axis represents the type of group employed and the vertical axis represents the supervisor's role. The examples are illustrations only of what might happen at the points of intersection. We've left room to add your own examples.

Table 10 Types of groups and supervisory roles

	Small group – individual student and one supervisor	Mixed – both small and large group	Large group – many students and many supervisors
Collaborative	Supervisor and student write a paper together. ………………………… …………………………	Supervisors and students work in mixed teams on a project. …………………… ……………………	Students and supervisors work together to critique project progress …………………… ……………………
Responsive	Supervisor shows the student a lab technique they are not mastering. ………………………… …………………………	Supervisor identifies student need in small group and uses large group to provide efficient instruction Supervisors identified individual needs in large group and arranges small group meetings as required …………………… ……………………	Supervisors monitor student progress for weaknesses, as the students present their work to the group. …………………… ……………………
Directing	Supervisor devises a research plan for the student. ………………………… …………………………	Supervisor devises plan in small group and uses large group as a forum to monitor progress and provide feedback …………………… ……………………	Supervisors assign reading lists and require student reports to the group. …………………… ……………………

A wide mix of strategies could be represented across the axes of a) supervisory role and b) the types of groups involved. The supervisory role refers to the type of interaction the supervisor has with the student, from directing to collaborative (see Section 5.7). The types of groups refers to the number of supervisors and students interacting simultaneously together (see Section 5.3).

APPROACHES MAPPED AGAINST SUPERVISORY ROLES

What might happen if supervisors adopt different roles (Section 5.7) whilst using the same approach (Section 5.2) to supervision?

Table 11 shows a few examples of how students and supervisors might interact. We have left room for you to add your own examples.

Table 11 Approaches and roles

Approach	Directing	Responsive	Collaborative
Scaffolding	Supervisor conceptualises the project as a sequence of related tasks. …………………………….. …………………………….. ……………………………..	Supervisor refers to formal requirements to respond to student needs. Supervisor refers to establish techniques, in light of student ability. ……………………………. …………………………….. ……………………………..	Supervisor and student plan own strategy to meet project goals. …………………………….. …………………………….. ……………………………..
Relationship	Supervisor and student meet frequently to monitor and negotiate student progress. …………………………….. …………………………….. ……………………………..	Supervisor seeks insight into student needs and makes individual responses to those needs. …………………………….. …………………………….. ……………………………..	Supervisor and student form a close, productive partnership. …………………………….. …………………………….. ……………………………..
Direction-setting	Supervisor requires the student to pursue the supervisor's agenda. …………………………….. …………………………….. ……………………………..	Supervisor prompts the student to consider the objectives of the project, as needed. …………………………….. …………………………….. …………………………….. ……………………………..	Supervisor and student work towards mutually agreed targets. …………………………….. …………………………….. ……………………………..

STRATEGIES MAPPED AGAINST SUPERVISORY ROLES

What might happen if supervisors adopt different roles (Section 5.7) whilst using the same strategy (Section 5.3) for supervision? Table 12 shows examples of how students and supervisors might interact.

Table 12 Strategies and roles

Strategy	Directing	Responsive	Collaborative
A. Creating groups	Supervisors and students meet regularly and student input is assessed by the supervisors.	Supervisor holds a seminar on a special topic when they identify a need in their students.	Supervisors and students meet to identify needs and offer solutions.
B. Creating structure	Supervisor establishes clear expectations about responsibilities.	Supervisor reviews student work e.g. monthly plan, TOC.	Supervisor and student devise a research plan together.
C. Generating outputs	Supervisor requires reports, papers, articles and ultimately a thesis, with specific outputs at specific times.	Supervisor seeks opportunities which will advance the student in areas of need e.g. conferences at a realistic level.	Supervisor and student agree on joint outputs and work towards them together.
D. Creating space	Supervisor plans down-time for the student.	Supervisor withholds an answer, so the student can discover it.	Supervisor and student talk around a wide range of interests to discover each other's contributions.
E. Establishing collaboration	Supervisor assigns the student to a research team, comprised of other students.	Supervisor introduces student to industry and other partners, according to student interests.	Supervisor and student establish a working relationship, with give and take on both sides. Supervisor and student learn together.
F. Focusing on the big picture	Supervisor conceptualises the research as a contribution to society.	Supervisor discusses student's career aspirations and project goals with the student and their influence on the candidature.	Supervisor's and student's strengths and weaknesses are acknowledged as influencers of the candidature.
G. Negotiating expectations	Supervisor expresses their expectations clearly e.g. "it is your thesis". Supervisor only accepts high-quality candidates.	Supervisor identifies student expectations and responds to them.	Supervisor and student discuss their mutual expectations.
H. Pursuing established programmes	Supervisor manages students so they pursue the supervisor's established agenda.	Supervisor perceives student interest in established programs and directs their attention to them.	Supervisor and student have established common interests which they pursue as a team.

LEARNING OUTCOMES MAPPED AGAINST SUPERVISORY ROLES

What might happen if supervisors adopt different roles (Section 5.7) whilst striving for the same learning outcomes (Section 5.4) to supervision?

Table 13 shows examples of how students and supervisors might interact.

Table 13 Learning outcomes and roles

Learning outcomes	Directing	Responsive	Collaborative
1. Topic expertise	Supervisor chooses the topic and imparts their insights.	Supervisor helps students discover their passion.	Supervisor and student pursue a topic of mutual interest and contribute equally.
2. How to get resources	Supervisor chooses the literature and monitors student's understanding. Supervisor assesses the logic of student's insights.	Supervisor supports the student as they navigate unsteadily.	Supervisor looks to student to discover new literature and see new connections.
3. Independence	Supervisor designs student experiences to compel autonomous action.	Supervisor encourages student initiatives as they occur.	Supervisor and student fulfil responsibilities interdependently.
4. Contributing to society	Supervisor refers to ethics committee requirements.	Supervisor discusses ethical implications of research with student.	Supervisor and student are attentive to the ethical implications of the project.
5. Teamwork skills and membership in a research community	Supervisor organises research group around a common topic and requires joint work, to a defined timeline.	Supervisor is alert to teamwork possibilities but lets the student choose whether to engage or not. Supervisor monitors progress against a timeline.	Supervisor and student form a productive team.
6. Publishing	Supervisor sets the goal of the number of publications and rank of journals/conferences.	Supervisor suggests publishing opportunities and edits student's work extensively.	Supervisor and student write and conceptualise together.
7. Developing as a professional	Supervisor presents the implications in society of holding doctoral qualifications.	Supervisor offers experiences related to the student's career interests.	Supervisor and student work together on activities relevant to the student's career goals.

9. HAVE YOU USED THE FOLLOWING RESOURCES THAT HELP?

RESEARCH STUDENTS CENTRE

The Research Students Centre is found at: http://www.rsc.qut.edu.au/

The Research Students Centre includes:

- a Graduate Capabilities resource with links to skill sets and online training for students;
- a number of project plan proformas that are also useful in creating structure and generating outputs, found in the section on the PhD;
- a list of research supervision capabilities and relevant workshops to help develop these capabilities. These may be useful resources in having discussions with research students, to create space. (http://www.rsc.qut.edu.au/studentsstaff/resources/index.jsp); and
- information about setting up a scholarship, procedures and policy, online resources, and accreditation and training.

QUALITY IN POSTGRADUATE SUPERVISION (QIPS)

QIPS is found at: http://www.rsc.qut.edu.au/studentsstaff/training/qutresources.jsp

This includes Supervisor Solutions, which presents the following modules:

- What is good supervision?
- A perfect match – the supervisory relationship in its initial, 'getting-to-know-you' phase.
- Face to face – the supervisory relationship in its maturing and mature phases.
- The write stuff – ways of helping student writing.
- A guide to etiquette – appropriate conduct in the supervisor-student relationship.
- Cross-border expertise – the issues surrounding supervision of students from Non-English-Speaking Backgrounds.
- Cracking the whip – overcoming blockages to progress.
- Approval ratings – the examination process and the supervisor's role in getting the thesis through.
- Connections – setting students up for employment after they complete their degree.
- The Big Picture – the context of Australian higher education policy.

The following resources are offered by Supervisor Solutions:

- Bibliography – The Course Materials Database, workshop materials, online activities, tools, case studies, the Quality in Postgraduate Research Conference, stories from supervisors at QUT, and links to websites offering information, advice and support.
- QUT Forms, policies and procedures – PORTIA, Code of Good Practice for Supervisors, intellectual property information, Tracking Postgraduate Supervision booklet, QUT PhD policy and procedures, degree regulations and scholarships.
- Finding help for your student – QUT support services for students, alphabetical index and Student Services Survival Guide for students.
- Reflective practice tools – Discussion pages, task checklist and workbook, action research, and supervision portfolio.
- Supervisor Training.

AUSTRALIAN TECHNOLOGY NETWORK LEARNING EMPLOYMENT APTITUDES PROGRAM (ATN LEAP)

ATN LEAP is found at: http://www.rsc.qut.edu.au/studentsstaff/training/qutresources.jsp

It includes the following modules:

- Project Management
- Entrepreneurship
- Leadership and Communication
- Research Commercialisation
- Public Policy

FIRST

fIRST is found at: http://www.first.edu.au/

The member check in name is 'qutedu' and password 'qut4072qld'. Examples of supervision agreements can be found under New Resources.

Resources available on the site include:

- on-line activities that individuals can use as self-instructional materials to develop their expertise as postgraduate research student supervisors;
- complete instructions and materials for offering face-to-face staff development workshops;
- case studies, with comments from the authors/developers which may be useful for both supervisors and facilitators of supervisor development sessions;
- tools, such as questionnaires and other prompts for discussion with students, or materials for evaluating supervision. The tools come with instructions and comments by the developers;
- bibliographies on postgraduate research issues; and
- links to other relevant sites.

Included in these resources are examples of supervision agreements. These may be useful in creating structure and negotiating expectations.

ADVANCED INFORMATION RETRIEVAL SKILLS (AIRS)

AIRS is found at:
http://www.library.qut.edu.au/learn/airs/index.jsp (for students)

http://www.kickstart.qut.edu.au/studysmart/ (for supervisors - select *eResearch Support Seminars*)

Student AIRS can be taken as an online course or as a face-to-face course. It is a compulsory coursework subject for PhD students. It includes information on:

- literature reviews;
- library services and information resources;
- bibliographic databases;
- advanced internet searching, management techniques and tools;
- current awareness strategies; and
- Endnote.

Supervisor AIRS is divided into two parts. The first part looks at the benefits of AIRS for the supervised students and how this relates to the supervisors themselves. The second part is a practical hands-on session that provides skills training for supervisors including database searching and export to EndNote, EndNote itself, alerts services and social bookmarking.

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OTHER USEFUL MATERIALS

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12. OTHER RESOURCES FROM THE SAME PROJECT

This resource is part of a series around the pedagogy of supervision in the technology disciplines. The papers form part of an Australian Learning and Teaching Council Fellowship program conducted by ALTC Associate Fellow, Professor Christine Bruce, QUT.

Table 14 Papers around the pedagogy of supervision in the technology disciplines

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.

Paper 1 creates the conceptual base and outlines a range of existing research related to supervision as a teaching and learning practice in our fields. This paper answers questions like:
- What is a pedagogy of supervision?
- Why a pedagogy of supervision for the technology disciplines?
- What does previous research tell us about supervision across disciplines?
- What does previous research tell us about supervision in Engineering?
- What does previous research tell us about supervision in IT?

Paper 2 reports key findings from workshops and interviews conducted with supervisors from the technology disciplines (Engineering and Technology) It answers questions like:
- What kinds of approaches do supervisors use?
- What learning outcomes do supervisors aim for?
- How do supervisors understand their role in the supervision process?

Paper 3 presents the pedagogical framework that has been derived from conversations with supervisors in the technology disciplines. IT answers questions like:

- What options do we have as supervisors?
- What does the pedagogical framework look like?
- What are the key elements of the framework
- How do the elements interrelate?

The papers are freely available from:

- the ALTC Exchange site, http://www.altcexchange.edu.au/pedagogy-supervision-technology-disciplines; and
- the QUT electronic publications archive, http://eprints.qut.edu.au/ .