The higher degree by research student as 'master': Utilising a design thinking approach to improve learner experience in higher degree research supervision

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Abstract

This article presents a work-based learning and research approach to professional postgraduate education specifically in the case of Higher Degree by Research (HDR) programs. It highlights a prototype of the Cohort-based Advisory Team (CAT) model as a useful strategy. The authors propose that a design thinking approach that empathises with the student experience as the "Master" of the design reveals insights that may inform future formal higher education in the professions. An overview of the design thinking process associated with the Professional Studies programs as developed at the University of Southern Queensland (USQ) is provided. Case accounts of HDR students in the law and engineering disciplines provide exploratory evidence of the student experience. The article concludes that there is a case to be made to professional associations that this form of professional development (work-based learning and research) should be recognised in terms of the contributions it makes to the knowledge, skills and abilities of graduates.

Keywords

higher education, postgraduate supervision, work-based learning, design thinking, professional studies

Introduction

Postgraduate research students make a valuable intellectual contribution to the research efforts of universities. In many instances, they enhance the research outputs and specialisation of the supervising faculty (Halse, 2011; Slight, 2017). Student completions often feature as a research and administrative priority in strategic plans of universities, community colleges, and colleges of further and technical education (Juszkiewicz, 2017). Despite the importance placed on student progression in higher degree by research (HDR) programs in Australia, reports of high attrition rates, declining well-being and low completion rates feature prominently in the literature (Levecque et al,.2017; Sverdlik, et al., 2018). Standards associated with the *quality*, *appropriateness* and *adequate* supervision of HDR students have been called into question over the last 20 years (Grant, 2005; Green & Bowden, 2012; Cuthbert & Molla, 2015).

As research programs expand, so do pressures to develop adequate supervisory *capacity* to cope with the number of student research projects. In particular, degrees associated with professional and work-based practice have gained popularity in higher education because they aim to fulfil a shortfall in transferrable skills necessary in the workforce and society (Lee 2009), leading to calls for new approaches to supervision (Engebretson, et al., 2008). However, literature covering this topic is scarce. For example, 15 years ago, Park (2005, p. 190) referred to a 'new style' of Ph.D. (including professional practice doctorates) requiring a "wholesome revision of assumptions and expectations", which necessitates adjusting "the expectations of students, supervisors and examiners" (Carr, et al., 2010, p. 280).

Some researchers have suggested that postgraduate supervision itself needs revitalising to keep current with the need for academic expertise and rigour (Cuthbert & Molla, 2015). Research conducted over the last 20 years in Australia and elsewhere demonstrates that challenges associated with postgraduate supervision include improper and inadequate supervision often associated with unresponsiveness and poor communication, inadequate levels of departmental support, and a lack of clearly identified and articulated procedures for timely decision making (Pearson & Brew, 2002; Golde, 2005; Cuthbert & Molla, 2015; Fergusson, et al., 2019a). Hence, a key premise of this article is that these are perennial issues increasingly associated with a traditionally dogmatic and possibly outdated view of learning and supervision.

Traditional academic approaches to supervision have favoured a transactional relationship, which likens the student's experience to an 'intellectual apprenticeship' (Grant, 2005). However, in today's academic culture, there is a tendency to move toward a more collaborative and collegial working relationship that recognises advancements in the often informal knowledge gained by students. This is especially so when mature students come into a research program with a wealth of professional practice experience. In this instance, supervisors take on a more 'academic' advisory role, guiding the study through a scaffolded structure of research rather than being an expert knowledge source, although content expertise obviously remains important.

The issue of attrition among HDR students is a further concern. A host of factors can cause students to cease their studies. For instance, student frustration with academic policies, disappointment with advising and alienating departmental climates have been found to contribute to attrition rates (Haynes, 2008; Rigler et al., 2017). In Haynes' (2008, p.17) USA-based research, students were found not to complete their studies due to: 23.9% changing career goals (mainly to take employment and petition for time extension); 23.9% transferring schools (seeking a better match), 17.4% for health reasons; 17.4% due to family demands/conflicts; 13.1% were counselled out or dismissed; and 4.3% had financial issues. More recently, Rigler et al., (2017) identified the main causes as: a)

supervisor agency and supervisor-candidate relationship; b) candidate socialization and support systems; c) candidate preparedness; and d) financial considerations. In Australia, between the years 2010-2016, around 437,030 domestic and international students were enrolled in postgraduate research programs across the country, but only 65,101 (14.9%), acknowledging that not all students would finish in the same year, completed within the same time period (Bednall, 2018), This data suggests that alternative paradigms are required to enable HDR students to better progress and complete their studies.

The supervisory model described in this article emerged from this context. It provides an innovative thinking approach to the program design and delivery. It demonstrates how traditional higher education teaching approaches can be adapted to meet the needs of learners through the development of a cooperative and interactive supervision model. This supervision approach recognises that within the work-based learning (WBL) pedagogy, the HDR learners are viewed as 'masters' within their professional field and as 'masters' of their learning journey. As such, it articulates an authentic personalised learning experience.

The issue addressed by this article includes the apparent inadequacies of traditional supervisory models that have become mainstream approaches in higher education. The inadequacies are associated with evidence that: a) postgraduate student attrition and completion metrics are at worryingly low levels; b) student attrition is somewhat related to inadequate supervisory and institutional support; and c) university capacity to adequately support students is limited especially within the context of increasing demand for certain postgraduate programs. In order to address these concerns, the program team in a WBL and research program at USQ, an Australian regional university, sought to design an alternate supervisory model and then evaluate its efficacy in meeting the needs of its students and increasing the capacity of the university.

Method

A reflective exploration of the experience of developing and implementing this HDR supervision CAT model based on the needs and challenges of students within a WBL research program is adopted. The explicit adoption of a reflective analysis follows the framework of 'what'; 'so what' and 'now what' espoused by Rolfe, Freshwater and Jasper (2001). Following a design thinking approach that starts with empathy as the subject of design, we introduce the CAT model as an innovative strategy to meet the needs of HDR students within a community context while at the same time increasing the capacity of higher education institutions to provide meaningful support. The authors emphasise the reflective approach and themselves as insider and invested researchers.

The CAT model was implemented in Semesters 1 and 2, 2018 as a pilot project. It was evaluated and tested in a real-world context with 22 HDR masters students against the *Australian Graduate Research Good Practice Principles* (AGRGPP), specifically Principle 5 as further explained in the *Guidelines for Quality Graduate Research Supervision* (GQGRS)(Australian Council of Graduate Research, 2018).

The authors begin by describing a rationale for the collaborative approach and the background of the Professional Studies program. Professional Studies in the Australian Higher Education context is defined as a term used to classify academic programs that are applied or interdisciplinary in focus. A description of the development, structure and function of the Cohort-based Advisory Team and CAT model following the principles of a design thinking process (Burdick & Willis, 2011) then follows. Lastly, based on the AGRGPPs and the associated GQGRS, the focus turns to a preliminary evaluation of the CAT model using the six *Principles* as a framework, and invited dialogue and

reflective analysis of the supervisory process by current students using standard formative evaluative techniques described by McDavid, Huse and Hawthorn (2018). Thus, the article reports on the findings of this evaluation and suggests future areas of research.

Approaches to Supervision

Research suggests that cohort-based approaches benefit students by giving them a more supportive, broader learning environment and community while also enabling less experienced staff to increase their supervisory capacity (de Lange, et al., 2011). Berteau and Villeneuve (2006, p. 45) defined 'group supervision' as a process of ongoing dialogue for reflecting upon professional practices. The goals, the experiences, the resources of both supervisee and supervisor (indeed the group process itself) all make their contribution toward the goal of providing quality services as well as meeting the needs for skills development in a learning community.

Cohort supervision models have evolved in postgraduate supervision as part of the debate surrounding solutions for poor completion rates for postgraduate degrees (de Lange et al., 2011). However, the intention driving cohort supervision models do not appear to have included a design thinking approach (Brown 2008) where the object of the design is to be solely guided by the anticipated needs and aspirations of the subject, in this case the HDR student. Moreover, in design thinking, even peripheral benefits and parameters are necessarily integrated into the design framework prior to ideation.

The HDR program that is the subject of this article represents a suite of Professional Studies postgraduate HDR students at the masters and doctoral levels (van der Laan & Ostini, 2018, Fergusson, et al., 2018). As a postgraduate program, Professional Studies is designed to promote access and equity to formal educational opportunities focused on WBL and research for those in their mid to senior careers with five or more years of experience in their identified profession (van der Laan & Neary, 2016). The program was designed to ensure an educational experience that is stimulating for participants, directed by the individual, academically rigorous while also contributing to the knowledge of professional practice and relevant work applications. The intent of the program was to respond positively to the imperative of public/private collaboration by responding to real life, real time, professional practice questions, including research engaging with complex or wicked problems (Fergusson, 2019).

The specified ethos and WBL approach encapsulated in the Professional Studies program (van der Laan & Ostini, 2018; Fergusson, et al., 2019a) builds on a pedagogy that recognises that "higher education institutions are increasingly connecting with broader constituencies of communities and external partners" (Irish Universities Association, 2018, p. 3). This WBL research program consists of a wide range of multi-disciplinary topics (as shown in Table 1) that are necessarily associated with the complex nature of contemporary work practices. These research topics require multi-disciplinary supervisory teams and, in many instances, supervisors with a knowledge of practice as well as scholarship in the discipline. As a result, adequately supporting HDR students requires a different strategy from the traditional discipline-specific approach to HDR supervision.

Professional Studies, as instituted by the authors, is known for accessibility, equity, quality and innovation in postgraduate studies. The program has experienced challenges associated with rapidly growing demand. This becomes particularly evident when securing the supervisory resources necessary to assure timely, high quality, and effective supervision for HDR students. To overcome these challenges, the design and implementation of the CAT model accounts for the expanded supervisory requirements of the program. The goal was to provide a two-tiered, student-centred,

supervisory support model that emphasised a shared learning experience within an HDR student learning community. The CAT model thus sought to respond to the challenges by maximising human resource availability, external practice expertise, community support resources and high-quality leadership while increasing performance outcomes for students.

Development of the cohort-based advisory team model (CAT Model)

The Problem

During 2017, there was a significant increase in demand for Professional Studies postgraduate degrees. There was also an impending shortage of and lack of supervisory capacity with which to deliver appropriate research supervision in relation to the anticipated growth in the number of students. In addition to the widely reported rates of attrition and low completion rates of HDR students, a broader problem was identified related to inadequate student experience. As such, the student experience became the focal point for the development of a revised supervisory model that would also add supervisory capacity to the program. This perspective highlighted the need for fresh, innovative thinking around program delivery and effective supervision. As part of its continuous quality improvement effort, faculty identified the need for a supervisory model that could enhance student experience and performance while also functioning at scale.

The Foundations

The CAT model was designed around the concept of supervision as a student experience in a learning community. The community was conceptualised as a physical and virtual space in which students, supervisors, team members, peer reviewers, and domain specialists form a community of excellence in teaching, research, publishing, and WBL and research project implementation. The learning community was designed and developed based upon seven foundational pillars of the program. These seven pillars were intended to deliver a 'triple dividend' contribution as an outcome of completing the award (van der Laan & Neary, 2016, p. 16); that is, a threefold contribution or benefit to the development of the learner, the domain of practice and knowledge of professional practice.

Pillar 1. Publishing and research impact evidencing learning and teaching efficacy;

Pillar 2. Multi-disciplinary professional practice domains with relevant and compelling research;

Pillar 3. Academic quality;

Pillar 4. WBL and research pedagogy as an approach to research of professional practice;

Pillar 5. An ethos of individualised, altruistic learning programs from which students take ownership of and enjoyment in their learning and research as part of a values-based learner experience;

Pillar 6. Face-to-face learning as part of a blended learning experience; in combination with

Pillar 7. An online delivery platform-based on Salmon et al. (2010) five-stage model of scaffolded learning.

Figure 1

Seven Pillars underpinning Professional Studies learning communities
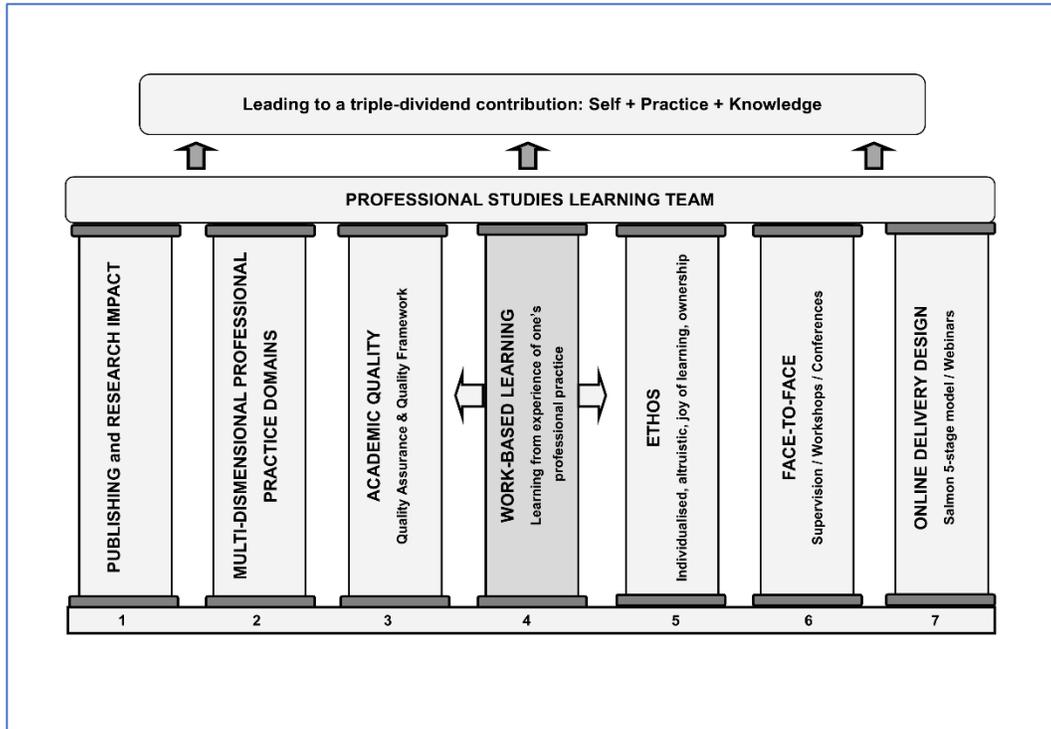
The ethos of the Professional Studies program promotes mutual respect and transparency as well as fostering an altruistic spirit (Fergusson, et al., 2019a). A supportive learning environment along with an encouraging hands-on and pro-active approach to supervision as described by Sinclair (2004), was important to improving completion rates. Congruent with ethos, it was deemed essential to create a supportive environment that not only monitored a student's academic progress, but also their overall wellbeing. We asked: 'how would they feel' in this learning environment? Thus, in 'designing' the learning community an attitude of empathy guided the idea that the community should embrace a practice of considering the whole student when it assessed the student's progress through the program toward completion.

As shown in Figure 1, the central pillar 4, supports the entire learning community edifice because at the heart of Professional Studies is a WBL research pedagogy around which all other educational and practice-based decisions are made and other work-related activities are carried out. The two inner pillars 3 and 5 focus attention on core values related to the academic quality of the program, guided and measured by a series of quality assurance and quality control variables. The four outer pillars 1, 2, 6 and 7 provide the outer structural support for the CAT model. They include publishing impacts and evidence of practice-based research impact, multi-disciplinary practice domains generating relevant and compelling research, blended learning experiences for all students including an online experience of learning and teaching according to the model advocated by Salmon, Nie and Edirisingha (2010). The detailed and unique learning and teaching elements of each pillar is the subject of either current research, or, in the case of pillar 7 for example, established online learning

and teaching norms. In this sense, a learning community can be defined as a group or cohort of students, supervisors, peers, team members and domain (or industry) specialists involved in various domains of practice, which share a common interest in research that contributes to knowledge of professional practice.

The Process

A design thinking approach (Plattner et al., 2009) was used in the development of the CAT model and adapted from other work in education Carroll et al. 2010; Burdick & Willis, 2011). The conceptual framework for design thinking of the CAT model set a series of challenges through which six key components of the design process were identified and addressed. Thus, design challenges were created by focusing on empathising with the learning experience of HDR students as reported in the literature (Park, 2005; Lee, 2009) and feedback received from students in the program since 2012. The process then embraced varying levels of ambiguity related to conceiving alternate designs of the community and program. Together with the seven pillars of the program and other elements such as course feedback (obtained by faculty at the end of each semester), peer review during article publication, community interactions, university support structures, and specialist input, a 'frame' for the design was established to guide the development of a CAT model prototype.

The components of the design thinking process included the following: a) understanding and empathising with the student; b) defining the problem and possible solutions to it; c) framing the solution; d) ideating or conceiving alternate models to solve the problem; e) developing a prototype; f) testing the prototype; and evaluating the evidence derived from testing the prototype. Figure 2 shows this basic structure of design thinking, as it relates to the CAT model.

Figure 2

Design thinking approach to the development of the CAT approach to HDR supervision
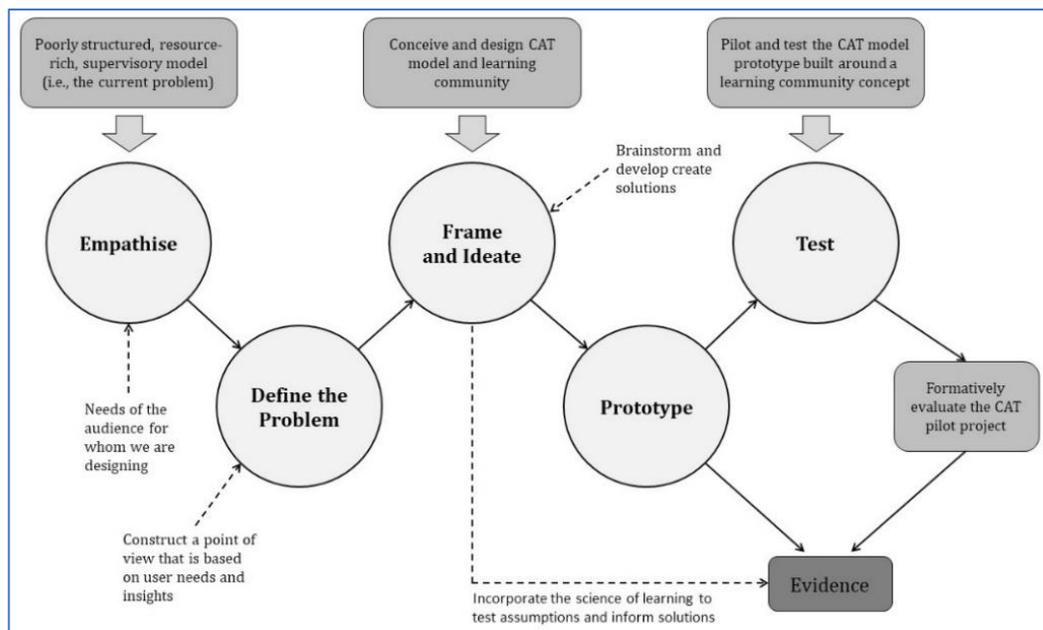
In designing the CAT model, we sought to understand the potential issues of inadequate and/or inefficient student-supervisor arrangements, the increased demand for HDR supervision in 2018 and beyond, and the potential resource shortage and lack of capacity for supervisors to deliver consistent, high-quality and timely research supervision.

Design thinking in the case of the CAT model assumed that the traditional approach to supervision may appropriate more human resources than are currently available while isolating the student to limited interaction with only their two designated supervisors. A key premise of the design was that this limitation in capacity and isolation. The authors began to define the problem and identify what possible supervisory alternatives might exist or might need to be developed. They constructed a point-of-view using the formula: User [student] + Need [e.g. lack of responsive supervisory resources to meet demand] + Insight [team of supervisors, shared supervision, clustering of student according to domain of practice, etc.] = Point of View Statement. Based on this logic, framing an alternative model was conceived through brainstorming what appeared to be a creative solution to the problem. From this, the CAT model evolved as a prototype.

Pro-tem Supervision

The standard HDR model of supervision requires that every student must have a minimum of two qualified and registered supervisors (i.e., a principal and associate supervisor) allocated to them prior to entering the program. In the Professional Studies program, a system of *pro-tem* supervision allows students time in the program before committing to a permanent supervisory arrangement, and the necessary time to familiarise themselves with the WBL pedagogy in order to develop their topic before committing to their longer-term supervision.

The *pro-tem* system allocates two temporary or interim supervisors until the student has submitted a Learning Program that: a) locates their professional learning within a capability framework, b) identifies individualised learning objectives for their study, and c) specifies their research topic and interest. The key premises underpinning this approach are that students:

- Should be able to settle into the program and thereby better manage expectations
- Should have time to become more aware of their capabilities and learning needs
- Are able to mentally prepare for their study at the requisite level
- Are able to set their own learning objectives that will guide and personalise their study
- Be less influenced by supervisors' specialisation and interests;
- Should develop complete ownership of their topic, thus promoting their motivation and passion
- Are afforded the time to familiarise themselves with possible supervisors and consider the supervisory 'match'.

The *pro-tem* supervisory approach only requires two supervisors to be responsible for all students in the cohort, not multiple sets of two different supervisors for each student. While not specifically part of the CAT model described in this article, the *pro-tem* supervisory system provides a partial solution to the current supervisory model that is resource heavy and can lead to misalignment of the supervisory relationship.

To date, the *pro-tem* supervisory system has been particularly effective in providing consistent feedback, improving student ownership and supervisor identification, and enhancing student retention. In particular, the initially structured approach to 'on boarding' students in their first semester is to create an enabling learning community where students are required to interact with

their peers in online activities as facilitated by the Salmon 5-stage model of online program delivery (Salmon, Nie, & Edirisingha, 2010; Salmon, 2013) as illustrated in Table 1. This process culminates in peer-driven knowledge construction and development, and students are thereby afforded the time to familiarise themselves with possible supervisors and consider the supervisory 'match'.

Table 1

Salmon's five stage model of teaching online (Sourced: Salmon, 2013)

Stage	Student Activities	Tutor Activities
Stage 1 Access and motivation	Setting up system and accessing	Welcome and encouragement Guidance on where to find technical support
Stage 2 On-line socialisation	Sending and receiving messages	Introductions Ice-breakers Ground rules Netiquette
Stage 3 Information exchange	Carrying out activities Reporting and discussing findings	Facilitate structured activities Assign roles and responsibilities Support use of learning materials Encourage discussions Summarise findings and/or outcomes
Stage 4 Knowledge construction	Conferencing Course-related discussions Critical thinking applied to subject material Making connections between models and work-based learning experiences	Facilitate open activities Facilitate the process Asking questions Encourage reflection Tutor is very active at the stage
Stage 5 Development	Use of conferencing in a strategic way Integration of CMC into other forms of leaning Reflection on learning processes Students become critical of the medium	Support Respond only when required Encourage reflection Tutor is less active and hands over to the students

Once *pro-tem* supervision is completed and students move to their next phase of study (i.e. the research proposal development phase), they are allocated, after consultation, their two CAT model supervisors.

The traditional supervisory model would have required 44 supervisory appointments to meet the needs of the 22 HDR masters students enrolled in Semester 1, 2018, (36 if allowing for the likelihood that six supervisors may have more than one student to supervise). Each of these supervisory teams would also be independent of each other and isolated from other students in the cohort. Under the *pro-tem* system, only two dedicated supervisors were required to supervise the 22 students prior to entering their supervisory appointments under the CAT model. Our experience revealed the following benefits of the *pro-tem* system:

- Capacity to accommodate and engage more mature work-based experienced students;

- Allowed students to develop individualised learning objectives aligned to their research interests and their research proposals before approaching longer-term supervisors;
- Improved the long-term 'match' of student to supervisor and thereby increase the likely success of the supervisory team and work-based research project by having a better articulated proposal and having the time to 'get to know' the supervisors;
- Developed ownership of and passion for the topic by developing individualised learning objectives and recorded topic titles thus avoiding any possible topic bias of supervisors; and
- Provided a supportive and structured pathway to confirmation.

Personalised Learning

The *pro-tem* and CAT model approaches are designed to achieve an authentic personalised learning student experience. Indeed, personalisation in higher education is described as 'imperative (Järvelä, 2006). Much of the literature interprets personalised learning in higher education in terms of a) access and participation, b) modified learning spaces, c) achieving motivation, d) domain specialisation, and e) the role of the educator (Järvelä, 2006). The more recent literature focuses on personalising learning spaces and the role of the physical and digital interface as modified by the student (Keppell, 2014), with a focus on pedagogy and delivery in e-learning (El-Hussein & Cronje, 2010; McLoughlin & Lee, 2010; Wanner & Palmer, 2015; Maseleno et al., 2018). The authors propose that this technology-driven focus detracts from the broader imperative of meeting the student's needs and specific aspirations in a holistic and tailored way that meets their capability and learning style profiles. The latter statement is the preferred definition of personalised learning that was adopted by the program.

While these themes are important in terms of personalisation, the literature on and evidence for personalised learning in higher education in terms of personalised student outcomes is rare. It is still common that students are required to achieve generic learning objectives as set by the university courses/programs. This is accepted and necessary but what may be of benefit is tailoring the outcomes in alignment with each student's learning aspirations and capabilities. Departing from a 'one size fits all' approach, the Professional Studies program facilitates a reflective practice process (van der Laan & Ostini, 2018, Fergusson, et al., 2019) requiring students to determine their own individualised learning objectives for the program while under the *pro-tem* supervision arrangement.

These personalised objectives are derived in order to enhance student ownership over their learning while in the program and serve to motivate their efforts. The final assessment of their research study, the external examination of their thesis, includes revisiting their learning objectives and providing evidence of the extent to which these objectives are achieved as individually assessed. Further research is being conducted to evaluate what contribution is made by this approach to the notion of personalisation in higher education.

The CAT Model Prototype

At the end of *pro-tem* supervision, in consultation with students, two CAT supervisors are assigned to each student to guide the remainder of the work-based project and research of the degree. The model is designed to provide students with greater student-to-supervisor alignment, a more collaborative and interactive learning environment, and additional expert and associated support while encouraging project ownership. At the centre of the CAT model is the learning community, composed of students and a CAT supervisory team. Figure 3 outlines how supervision is 'flipped' and managed in the CAT model as supported by the supervisory team.

To illustrate the benefits of this example (Figure 3) the exemplar shows eight HDR students entering the program. They are at the outset required to interact through an online learning management system (LMS) which is scaffolded toward developing a learning community and facilitate peer-to-peer and peer-to-supervisor learning. The model locates students at the top of the diagram to indicate that the CAT supervisory team plays a supportive not dominant role in the supervisory relationship. The CAT team is composed of a chair, a principal supervisor, subject-matter expert associate supervisors, team members (i.e., support staff and faculty to administer and support the learning community), and domain specialists.

Figure 3

Illustrative example of CAT Model learning community and supervisory support structure
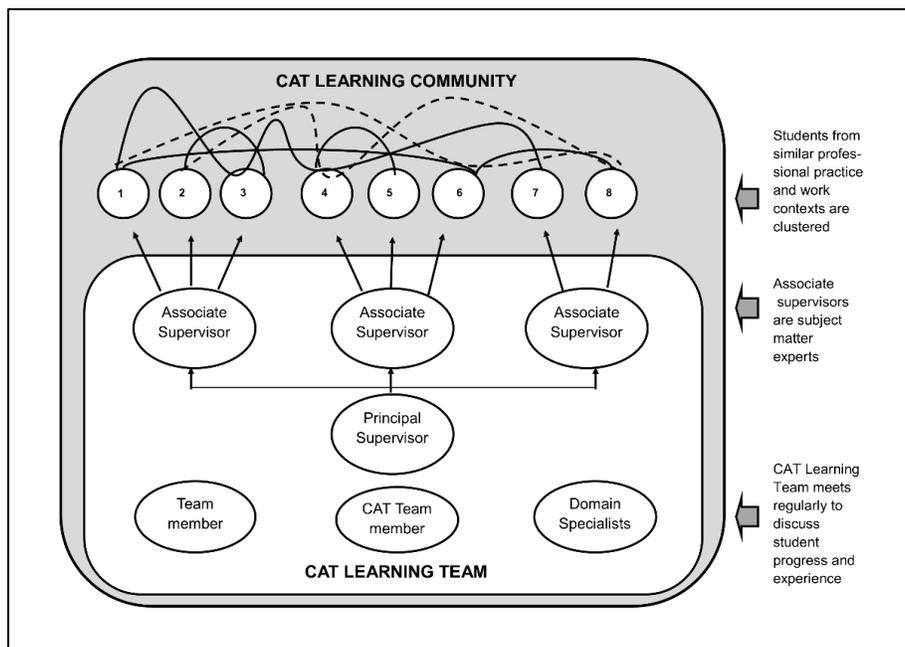
Domain specialists or practice experts (Lethbridge, 2006) are recognised experts in a specific practice domain or industry. For instance, in the program there are policing and emergency services experts as just one example. They provide industry-specific knowledge and perspectives on WBL projects related to their domain, but they are not officially identified as supervisors or university staff.

Because of economies of scale and enhanced communication technologies utilised by the program, the CAT model for eight students in this example only requires four supervisors not the 16 under the traditional model. This grouping becomes possible and more efficient supervision of one student's work-based topic is not entirely distinct from another in the same cohort due to their affiliations in professional practice. In order to spread the workload more evenly, the principal supervisor is allocated a 20% supervisory load for each student, while the associate supervisors are allocated the remaining 80% of supervisory load and take a leading role in guiding the research. This may seem counterintuitive at first, but its benefits become apparent in the functioning of the model.

The primary role of the principal supervisor is to assure academic progress, integrity, and academic rigour. The principal supervisor is selected based on their significant experience and expertise related to HDR supervision and methodological rigor. In addition to supervising students, CAT supervisors participate in a monthly progress meeting of the CAT supervisory team in order to discuss and monitor the progress and needs of students within the learning community. This also allows support and problem solving to occur across the learning community as a whole, providing greater support for students, if needed.

Figure 4 provides a more detailed examination of the CAT learning community. In this diagram, and in keeping with the program's ethos, the student cohort is placed at the centre of the model to indicate the centrality and importance of students to the CAT model and to Professional Studies more broadly. In most cases, work-based topics are multi-disciplinary. Hence, Figure 4 conceptualises the alignment of students and their topics with associated practice domains and academic disciplines to inform the identification and alignment of CAT model supervision. By aligning the topic with multi-disciplinary practice, the CAT Learning Team can identify the most suited academic supervisors for each student's study. The practice domains include the disciplinary expertise of associate supervisors whose responsibility it is to provide the bulk of supervision to students within the cohort, with the principal supervisor responsible for overall program quality control and assurance.

Figure 4 demonstrates the interactivity between each of the elements and roles within the learning community. Emphasis in the CAT model is on learner-centric learning, and hence the entire model is designed to not only see the progress of each student through the program via online and face-to-face interactions, but also to build networking and communication expertise, opportunities, and processes. The learning community also consists of a course moderator, examiners and peer reviewers, along with academic support personnel, such as librarians and statisticians. It also utilises a range of purpose-designed tools, communication platforms and handbooks.

Figure 4

The structure of the CAT Model Learning Team
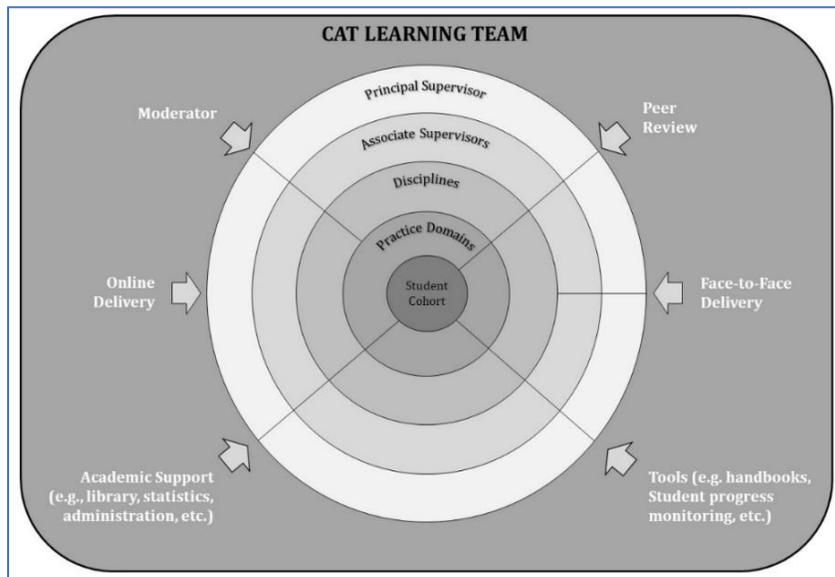
In 2018, when the CAT model was first adopted, the learning community was supported and guided by the chair, program support staff and domain specialists. Domain specialist skills included: a) allied health, oral health, public health hospital and health care; b) competence-based learning capabilities; c) policing, law enforcement and offender management; and d) leadership, strategy, organisational change and behaviour. In addition to these, the CAT learning community consisted of one principal supervisor and ten associate supervisors (eleven supervisors in all) to provide supervisory support for the 19 new HDR students. Since then, another 54 students and 13 supervisors have entered a total of five CATs.

This shows that prioritising the interests of students does not interfere with achieving significant efficiencies and scale. Moreover, in the standard model, multi-disciplinary cohort supervision is unlikely and the presence of domain specialists and support staff are not readily available. Table 1 illustrates how this was achieved by aligning the student topics of study against supervisor expertise and specialities.

Table 1

Example of student topics aligned with supervisor discipline expertise in 2018

Project Number	Student Topic	Supervisor Discipline Expertise
1	Evaluating the Impact of Restorative Justice Model of Policing in the Logan District on Robbery Offences: A Work-Based Study	Law, justice, crime and community policing
2	Ethical Boundaries and Professional Distance: Exploring Queensland Police Service Criminal and Misconduct Allegations	
3	A work-based study exploring the internal communications maturity of the Queensland Police Service and its impact on employee engagement	Management systems, disaster management and logistics, and strategic leadership
4	Digital era, cyber-crime and the changing capabilities required by Queensland Police service	
5	How Queensland Fire and Emergency Service can contribute positively to the first responder role	
6	Evaluate and validate the purpose and future possibilities of the counter-terrorism community safety centre (CTCSC)	
7	Critical Queensland Police Service policing incidents and organisational learning: Developing frameworks for analysis	
8	Single Officer Police Station efficacy in Regional Queensland: An analysis of alternative service delivery for Townsville	Work-based learning, educational administration and management, vocational education and training,
9	Examining the impact of process improvement coaching on middle management: A work-based study	
10	The development of a Queensland Fire and Emergence Service major events planning unit	
11	Evaluating professional standards capabilities to influence workplace culture within Queensland Fire and Emergency Service	

12	Effectiveness of communication strategies on diversity values so that Queensland Fire and emergency service urban station staff more actively engage?	management and governance
13	Psychological resilience of the Queensland Police Service officers, post officer involved shootings	
14	A comparative analysis of clustered and centralised policing deployment models: A mixed-method study in metropolitan Townsville	
15	The importance of developing self-awareness to enhance personal responsibility for female adolescents in Australian regional areas: A mixed method study evaluating self-reflection and self-awareness	
16	Investigate the knowledge of research ethics among Darling Downs Health and Hospital Service professional staff, to inform future training initiatives in research ethics	Allied health and research
17	Pelvic floor muscle strength in mature-aged women in Queensland	Health sciences, physical education and gender diversity
18	Investigate relationship of leg strength to body weight ratio and agility performance in competitive, female, high school multi-planar sports in Queensland	
19	Adolescent female sport athletes and lower limb injuries: Investigating the effect of specific hypertrophic training and landing mechanics of athletes in Queensland	

At its monthly meetings, the CAT team used a template to monitor individual and cohort progress through the program. The template contains the student's name and topic title, along with the names of the student's principal and associate supervisors. The template allows supervisors to rate the student's progress in the preceding month according to ratings of none, poor, average, good and excellent, and allows for general feedback and notes.

Of importance is the ability to note if the students have any needs that extend beyond those that the supervisors can meet. Notes in this field would trigger further support from the rest of the learning community. The template also records whether the student has completed the Confirmation of Candidature process and rates the percentage of completion for both the thesis and publishable article. These three entries represent the main milestones of the degree outcomes resulting in a thesis and a publishable article as its capstone summative assessment.

Discussion and Reflective evaluation of the Cat Model

As part of the design thinking process, the prototype was formatively evaluated to estimate the extent it met with the design frame and addressed the 'problem' criteria. To this end, the evaluation framework included three dimensions:

- *Australian Graduate Research Good Practice Principles*
- Student experience as translated from feedback
- Student retention and progression.

Australian Graduate Research Good Practice Principles

The AGRGPPs (Australian Council of Graduate Research, 2018) seek to strengthen the quality of graduate experience while promoting high levels of academic quality, governance, policy and procedure for HDR students in universities. The university systems of the graduate research office (GRS) account for the implementation of policy and procedure relevant to the program and, as such, were outside the scope of the evaluation. However, under each principle various CAT-specific measures were taken to ensure the principles set out by the AGRGPPs were met. These included:

1) *Transparent admissions requirements:* In addition to standard university procedures, every student entering the program is interviewed to ensure awareness of the nature of the program, feasibility of the proposed research and capacity to conduct the research.

2) *Adequate and appropriate support:* This principle was central to the CAT model, the development design and thinking process in its evaluation.

3) *Development of original research and scholarly activities:* work-based research supervision remains rare. The program has consistently illustrated through external examinations and publication acceptance rates that the research is relevant and original. The program and university provide numerous opportunities to engage in scholarly activities, which include activities designed around peer-to-peer knowledge construction within the learning community, such as through e-tivities, that require students to fulfil a written task, share it with their peers and then respond to the written tasks.

4) *Provision of relevant support service resources to enable completion:* The University provides a range of research training and support resources. These include dedicated library, tutoring, student services, university relationships and graduate research support services. In addition, the CAT model provides dedicated domain specialisation and CAT-specific team support that extends significantly beyond the standard two-supervisory model.

5) *Adequate and appropriate supervision:* This principle is central to the CAT model. Evidence of student retention and progression, together with positive student experience feedback of the overall academic supervision supported with the additional practice-domain expert input suggest that this principle is a key strength and priority.

6) *External examination:* External benchmarking is an important indicator of quality. While the program requires external examination, it also requires students to formulate a publishable article that disseminates their findings. This incorporates an additional layer of external peer review above that required in a standard Master's or PhD.

Student Experience

Students evaluated their experiences by providing feedback directly to their supervisors and through anonymous university-based student evaluation surveys at the end of each semester. In general, student feedback indicates satisfaction with the following: a) the level of institutional support

experienced, b) the learning environment structure and community, and c) student motivation associated with interacting with peers and university faculty.

The verbal and written feedback associated with institutional support from students was positive of the CAT supervisory process. Students reported that the structure of the CAT model created an enabling learning environment that provided personalised support. Comments such as "I appreciate all the ongoing support from … the team" were common. There were no comments suggesting that more support or other specific areas of support were required. Limited negatives comments raised concern about the technical aspects of the online delivery process.

In terms of motivation to progress, some students commented: "At this point, the best part is the support and the enthusiasm to 'keep going' by the teaching staff"; "I am very much looking forward to moving on with the research project"; and "I am really enjoying this course, on the back of the support you and the team have shown us all".

Student retention and progression

To address reported adverse supervision challenges, the authors deliberately focused on the delivery of a foundational program ethos and approach as described. This included the *pro tem* 'onboarding' and reflection phase that culminated in individualised learning objectives. These also emphasised student wellbeing and motivation as part of the course. As reflected in the following comment, the selection of domain specialists was enhanced student's ability to tailor their WBL research project along with scholarly activities: "I just wanted to share with you and the CAT team …During a conversation [with a senior officer] I told her about doing the Master of Professional Studies and my research topic. …[She] then offered me a secondment to work on writing the policy! ...What great opportunities this course can provide."

Finally, the proactive ethos-based CAT model as a supervisory approach has resulted in low attrition rates and students have reported an enhanced learning experience associated with their progression and lower likelihood of exiting the program. As of June 2020, of the 22 students who enrolled, three students deferred for work-related reasons, 16 students have completed confirmation of candidature, and three have graduated. Student progress is monitored and recorded on a monthly basis and indicates most students are at or ahead of university progress guidelines and retention targets for HDR students. Comments support this: "I love the self-paced aspect of the program…the structure and the process is very clear and reasonably easy to follow"; "Your ongoing guidance and feedback have made the difference between pushing on or being overwhelmed by the content"; and "The support from the teaching staff is exceptional".

Conclusion

This reflective evaluation of the CAT model has demonstrated that the approach resembles what may be a scalable and effective supervisory approach that addresses some of the issues faced by HDR students at Australian universities. The model allows for a flexible and transparent supervisory structure that supports students (pre-dominantly mid to senior career professionals) during their research process. Feedback from students and supervisors indicate that the model offers a flexible and enabling study environment thereby increasing student motivation, confidence and progress. The model compliments an internal quality assurance checking process aimed at maintaining research rigor and consistent oversight through optimal support for students. Team members and the broader university systems primarily achieve this through peer-to-peer knowledge construction and support, the knowledge contributions by domain specialists, principal supervisor oversight, disciplinary supervisory guidance, and university support.

Thus far, the reflective evaluation suggests that the CAT model environment has facilitated the student's learning experience, timely progress and rigor of research projects while achieving a high level of retention. Further research is required to test the efficacy and fit-for-purpose of the model against the design problem and framework over a longer period. At this stage, the proactive supervisory style within a learning community appears to address three of the four areas identified by Rigler et al., (2017) observed to cause HDR attrition.

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