



## **Novel Approaches to Enhance the Quality and Impact of Post-Graduate Student Supervision at CPUT**

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## **Abbreviations and Acronyms**

CHE	Council on Higher Education
CoP	Community of Practice
DHET	Department of Higher Education and Training
DSI	Department of Science and Innovation
HEQC	Higher Education Quality Committee
HEQSF	Higher Education Qualifications Sub-Framework
MOU	Memorandum of Understanding
NDP	National Development Plan
NQF	National Qualification Framework
PG	Postgraduate
PhD	Doctor of Philosophy
RTIP	Research, Technology Innovation & Partnerships
SDG	Sustainable Development Goals
SSMP	Sisonke Supervisory Mentorship Programme
UG	Undergraduate

“Don't tell me the moon is shining; show me the glint of light on broken glass”

**Anton Chekhov**

## 1 Introduction and background

The Cape Peninsula University of Technology (CPUT) recently went through several policy and strategy reviews and adopted new processes to guide the institution's management. Among the reviews was the CPUT Statute, amended and published in May 2022. CPUT also launched the acclaimed 10-year Strategic Vision 2030 (V2030), which seeks to guide and foster the alignment of all the institutional plans. The decadal strategy aligns with national, continental, and international imperatives such as the South African National Development Plan (NDP, 2030), Africa Agenda 2063, and the United Nations Sustainable Development Goals (SDG, 2030). V2030 is implemented through several policies, including those that guide learning and teaching, research and innovation, and community engagement. The mission is about CPUT transforming its students, through *world-class researchers who inspire knowledge production and innovation that are cutting edge*. Where the policies are outdated or non-existent, they are being developed or revised to align with the vision and mission of the institution.

Focus Area 3 of Vision 2030 is a smart research, technology, innovation, and partnerships (RTIP) that is relevant and excellent in its knowledge production. One of the key policies in this regard is the current policy for Postgraduate Education and Research National Qualification Framework (NQF) levels 9 and 10. One of the aims of the policy is to *contribute to the assurance of the quality of higher degrees and research produced within the institution to meet national and international postgraduate education standards*. It is, therefore, the institution's strategic intent to enhance postgraduate supervisory capacity through the purposeful recruitment of accomplished supervisors and the training of novice supervisors. Supervision is a relevant issue for pedagogical research training at the university with significant implications in various settings, including industry and employer groups, student associations, and academics.

There is widespread acknowledgment of not only the pedagogical process of supervision as a form of teaching but also the relationship between the learner (postgraduate student in this case) and the teacher(s)/supervisor(s) is central to student success [1]. In [26] the authors suggest that supervisors need to achieve synchronicity between their own and students' identity positions and facilitate mutual sensitivity toward each other's backgrounds to achieve a mutually satisfying and beneficial space. The process of postgraduate supervision is widely seen as a form of teaching and the engagement of postgraduates in mentored research as a form of learning [1].

This document presents some of the strategies that CPUT has adopted in enhancing the quality and impact of postgraduate student supervision. The document also explores some of the challenges of the processes and the strategies that the institution is implementing to address them. Adequate and effective supervisory capacity like other priorities is geared toward the institution's "raison d'être" namely **student success**. The envisaged outcome is CPUT meeting or exceeding the national standard for postgraduate student success.

## 2 Guiding principles for effective postgraduate supervision

There are a number of approaches toward effective postgraduate supervision. The Report for Mapping Exercises on Doctoral Training in Europe [2] lists guiding principles for world-class postgraduate supervision as follows:

- **Research excellence** – *To ensure that the new academic generation is trained to be creative, intellectual risk takers and able to push the boundaries of frontier research*
- **Pedagogy of supervision** – *Adapt to new science and art of supervision as a teaching approach*
- **Enabling institutional environment** – *A well-resourced environment coupled with good working conditions, culture, and career development opportunities*
- **Multi/Inter/transdisciplinary research options** – *Prioritised focus on a broader scope for students to go beyond the signature pedagogies of their disciplines*
- **Internationalisation** – *Students and supervisors can leverage mobility and international research collaborations as well as benefit from global best practices in research, infrastructure, and teaching*
- **Exposure to industry and other relevant employment sectors** – *To ensure that postgraduates are attuned to current trends in preparation for the evolving world of work*
- **Portable (or Transferable) skills training** – *Diversification for skills learned in one context where research that can be useful in another in preparation for the knowledge economy e.g., communication, teamwork, project management, and/or technology*
- **Quality assurance** – *to enhance the quality of the research environment including transparent and accountable procedures for key processes such as admission, registration, and supervision; and*
- **Cutting-edge research topics** – *Focusing on prevailing as well as future regional, national, and/or global country issues i.e., research must be meaningful to society and all institutional stakeholders.*

CPUT V2030 aligns with some of these principles through strategies that enable research and postgraduate supervision. Table 1 shows selected strategies that aim to foster effective postgraduate supervision as outlined in the Vision 2030 Strategy.

**Table 1:** Selected strategies to enable effective postgraduate supervision at CPUT

Selected Strategy	Focus Area
<p>Providing responsive support and innovative technical solutions to meet the research, and technology innovation needs of researchers, postgraduate and postdoc students.</p>	<p><b>Focus Area 1: Goal 1. Objective 1.3</b> Provide technology infrastructure and support for research, scholarship, engagement, and creative activities</p>
<p>Develop relevant research focus areas and strengths, with continuing emphasis on research uptake in Modes 2 and 3, and some Mode 1 where relevant <i>(As an enabler, Quality of communication between Senior Officers, e.g. DVC RTIP, Postgraduate Centre and Senior Director: ICT)</i></p>	<p><b>Focus Area 3: Goal 3:</b> To increase CPUT's trans-disciplinary focus on mode 2 &amp; 3 knowledge production through strategic research initiatives to develop smart technology-driven solutions  Increase a new and innovative focus on building our unique integrated perspective of humanities and social sciences (HASS) with science, technology, engineering, and mathematics (STEM), across our teaching and research practice.</p>
<p>Invest in CPUT research capability and state-of-the-art infrastructure to ensure that we have the skills, capacity, systems, and approaches to generate a positive impact in industries and communities through our research</p>	<p><b>Focus Area 3: Goal 3, Objective 3.1</b> Invest in the development and growth of research leadership on all academic levels through a supportive research culture and academic career path by providing opportunities for the four categories of researchers to cultivate the skills needed for successful discovery, application, and impact-focused knowledge production.</p>
<p>Regularly review job and work trends, and design programmes that will be high in demand in an increasingly technology-driven world</p>	<p><b>Focus Area 3: Goal 3, Objective 3.3</b> Intellectual leadership and foresight to be future looking, based on research and data as exposed by DVC: Research, Technology Innovation and Partnerships, DVC: Teaching and Learning and as well as the respective Faculty Deans.</p>
<p>Active recruitment of value-adding Adjunct Professors and Scholars for junior staff mentorship and postgraduate supervision <i>(As an enabler, adjustment of recruitment, selection, and induction practices to appoint the most appropriate employees)</i></p>	<p><b>Focus Area 4: Goal 4, Objective 4.1</b> Re-imagine the CPUT workforce performing in a technology-driven and inspired environment, with skill sets, attitudes, and ability to adjust to the notion of One Smart CPUT</p>

### 3 Graduate Attributes

Graduate attributes may be broadly defined as the qualities, capabilities and understandings of a graduate which a university community agrees students should develop during their time at the institution, both for their future professions and to make a contribution as ordinary citizens [29]. The Council on Higher Education's (CHE) Doctoral Degrees Report published in 2022 [3] gives a summarised list of graduate attributes (Table 2). Although these are geared specifically toward the Doctoral Qualifications offered at South African universities, they are also for the most part applicable to Master's students. In-depth knowledge of the specific field of research, ethics awareness in research and professional conduct, critical and analytical thinking for problem-solving, and communications skills are of critical importance to Masters

students who more often than not constitute an institutional pipeline of future Doctoral students.

**Table 2:** Doctoral graduate attributes sourced from CHE Doctoral Degrees Report (2022)

Category	Attribute
<b>Knowledge</b>	<ul style="list-style-type: none"> <li>• Broad, well-informed, and current knowledge of fields or disciplines</li> <li>• Expert, specialized, and in-depth current knowledge of the specific area of research</li> <li>• Insight into the interconnectedness of the topic of research with other cognate fields</li> <li>• (Original) contribution to the field of study</li> <li>• Ethical awareness in research and professional conduct</li> </ul>
<b>Skills</b>	<ul style="list-style-type: none"> <li>• Evaluation, selection, and application of appropriate research approaches</li> <li>• Reflection and autonomy</li> <li>• Communication skills, including relevant information and digital literacy skills critical and analytical thinking for problem-solving, group dynamics</li> </ul>

CPUT has developed a set of graduate attributes in line with Vision 2030, and industry requirements. In May 2018 and August 2019, CPUT approved Assessment Rubrics for the Master's and Doctoral degrees, respectively. The documents also outline the specific outcomes that the graduates must achieve to attain the qualification. To achieve the outcomes outlined in these documents CPUT needs to set up an effective postgraduate supervision process.

#### **4 Current state of postgraduate supervision in SA higher education**

Supervisor overload and a balance between available supervisory capacity and the number of postgraduates enrolled is a challenge for most universities in South Africa. A study by [28] found there was a burden of supervision at most of the universities. The same author emphasizes that for institutions to be able to provide effective support to postgraduate students, it is critical that they have the capacity in terms of a number of teaching/supervisors with appropriate qualifications.

There are a number of challenges in the broader South African Higher Education sector regarding postgraduate student supervision [3]. These include but are not restricted to:

- A paucity of adequate and/or appropriate supervisory capacity at universities
- Unsuitable, unmotivated, and/or underprepared students
- Supervisor overload – i.e., an imbalance between available supervisory capacity and the number of postgraduate students enrolled
- Limited or low allocation of research funding
- High drop-out rates
- Low completion or throughput rates
- Inadequate support and advisory structures
- Inadequate systems, procedures, and policies for supervision
- Understanding of and adherence to research ethics



- Uneven allocation of academics involved in post-graduate supervision.

As indicated above, these challenges involve structures, national and institutional policies, procedures, competency of available supervisors, and research climate or environment. All these challenges have a bearing on the quality of postgraduate education that any institution can achieve. Mouton et al. in [31] found that many doctoral supervisors in South Africa conducted their supervision under less-than-optimal conditions, including increasing student numbers, demands for constant monitoring and accountability, the pressure of throughput rates and efficient completion, and moderate-to-poor quality students. It is against this background that there are continuing discussions within the higher education sector on types of supervision and the effectiveness of supervisory approaches. CPUT is struggling with the burden of supervision as the Work Sharing Model used by Faculties seems to limit academics who want to engage in research, for example in the Faculty of Engineering and the Built Environment (FEBE) academics have constantly called for the need to revise the model.

## **5 Progressive Supervision and Supervision Models**

There is a plethora of supervisory styles and models that can be used by academics in the training of postgraduate students. An assessment of existing or new innovative supervisory models that are gaining currency in South Africa and beyond include the following:

### **5.1 The dyadic model**

The dyadic model is a classic supervisory model which focuses on the interaction between supervisor and student. In this model, there is one supervisor and one student. This is an individual model based on the student's interest and/or the supervisor's interest [4]. Ngulube in [5] noted that in South Africa the dyadic model is still the predominant postgraduate supervision style.

### **5.2 Group supervision model**

Group supervision is where one supervisor works with several students. It is designed to encourage the exchange of ideas, mentoring students in relation to good practices in the research process and inducting them into the academic community while reducing isolation, a key feature of many postgraduates' life. Group supervision can also assist students in further developing their nascent writing processes as well as the impact on the student writing process and their enculturation into a specific discipline. From a supervisor's perspective, Group Supervision tends to enable the development of supervision skills and also overcomes the feeling of seclusion even for supervisors [6]. Other key attributes of this style of supervision include:

- Creation of a positive climate of learning with students feeling comfortable,
- Where interactions and content can be easily accessed and engaged with,
- Growth or promotion of trust, and
- Peer participation.

Samara in [12] reported or noted that group supervision facilitated the development of supervision skills, positively impacted the student's writing process, and accelerated the student's enculturation in this context refers to the gradual process by which people learn the culture of their own group by living in it, observing it, and being thought things by mentors of the group. This is through experience, observations, and interaction.

An interesting variation to Group Supervision is the so-called Blended Group Supervision (BGS) model, which is similar to the supervisory support group approach. BGS, according to [6] provides an effective platform where students can utilize group feedback to develop independence and increased ability to self-assess through virtual peer learning while for supervisors group supervision tutorials can be handy for expanding the teaching aspect of supervision namely:

- conceptual and theoretical issues,
- research methods Specifically from the supervisor
- perspective, group supervision tutorials can be useful for exploring the 'teaching' aspects
- of supervision (conceptual and theoretical issues, research methods, academic writing
- formats, genre demands, and
- quality criteria.

Other envisaged outcomes of BGS an effective social and intellectual climate for postgraduate research. Another potential benefit of BGS is its potential capacity to enhance **connectivism** due to the fact that all forms of teaching including research supervision are impacted by technology [7]. Also recognized is that connectivism is a key enabler for a community of people working with technologies to legitimize what they are doing through interactions, sharing, dialoguing, and thinking together.

### 5.3 Co-supervision (Team supervision) model

The co-supervision model is described as a form of collaborative supervision where two or more supervisors guide and support one postgraduate student's research work. Ideally, each supervisor is offering substantial and relatively independent contributions to the research program of a student or students [8]. The primary benefits of co-supervision are well documented. These include amongst others, a variety of support and approaches to supervision, complex and cross-disciplinary guidance, teamwork and community, continuous feedback, quality assurance, networking, and pedagogical development [9] The pedagogical benefits according to [10] include the improvement in the quality of learning experiences by providing better opportunities for critical thinking, facilitating the convergence of several minds and creating greater potential for knowledge sharing [10]. From an institutional perspective, the two main drivers for co-supervision are interdisciplinarity and improvement of the quality of postgraduate student supervision.

Anecdotal evidence from CPUT and elsewhere points to some challenges with co-supervision, the key one being the inequitable workload between the co-supervisors. It is also vital that the rules of engagement are defined and made transparent. The same applies to each supervisor's role, including aspects such as the area/s of expertise that each will focus on. In terms of the former, whether the submission of all work will go to all of the co-supervisors at the same time, or whether the main supervisor will vet the work until s/he deems it suitable to go to the co-supervisor/s and also whether the input/feedback of the co-supervisor/s will be left at the discretion of the postgraduate student or will be considered as a group. Humphrey et al. [11] have reported a positive correlation between the appointment of a supervisory team and enhanced completion rates of doctoral qualifications in the United Kingdom.

#### **5.4 The coaching supervision model**

In the coaching supervision style, the supervisor(s) is very much involved in the growth of a postgraduate student. At the beginning of the student's study, supervisors are often involved in facilitating of what it means to do a postgraduate study/thesis, advice about time management, funding opportunities, library access, and contribution, information about resources, and research integrity and ethics. This style of pedagogy works well with adults, and considering that postgraduates are adults, this should be the pedagogy we need to think about as a "new model for research pedagogy and PG education" at CPUT, especially at Masters level where most students seem not to be ready for postgraduate study when they are recruited. The introduction of the Research Methodology modules at Advanced Diploma and Honours level also has the potential to cover this gap in research skills.

#### **5.5 Strategic cohort model**

This is the model according to Winberg and Winberg [13] proposed beyond STEM disciplines and found to be an effect where there was a research focus in any field – such as students supervised in a research centre or institute or under a research chair. The cohort model is a very supportive one – the candidate has a primary supervisor (usually a project leader) and two to three additional supervisors who have particular expertise. Specifically, this model refers to a group of about 10-25 students (or in many cases smaller groups) who study together and develop a series of experiences in the context of a doctoral program of study [14]. One of the stated reasons why this model is gaining currency compared to the dyadic model is that the former improves completion rates and tends to fast-track or enhance the quality of research supervision as compared to the latter [15]. The model focuses on developing leadership skills, advanced research, critical thinking, and problem-solving skills for various administrative and leadership positions [16]. There is usually a project leader, who has a research project with funding, including postgraduate funding, and the students' research studies are aligned with the project. The cohort-based model has been shown to result in higher student retention rates and the optimal shared educational experience. A growing body of evidence points to this model as also fostering cohesion through mutual academic, emotional, and logistical support for program success, collaborative learning, and timely completion as well as ongoing professional growth and career development [14]. Another envisaged benefit of the cohort model is that it creates or provides opportunities for novice supervisors to be mentored and inducted into supervision by working alongside more experienced supervisors.

The cohort model is more common in the sciences and engineering and has also been effectively used in the social sciences. There is a pre-registration period to orient the new doctoral candidates and to spend time writing the proposal and obtaining ethics clearance. This 'pre-registration' period is around one year. Candidates are accepted onto the program and register if their proposals are aligned with the university's strategic vision, and if they have made good progress on the proposal. There is a 'doctoral week' every term with intensive training, as well as individual supervision with the supervision team. This model is gaining currency at the University of Cape Town, the University of Johannesburg, and CPUT through collaboration on the Ph.D. in Engineering Education.

## 6 Institutional guide for training of Novice Supervisors

Training of novice supervisors is listed as one of the major challenges in postgraduate supervision in South Africa with significant gaps in the system for preparing novice researchers [3]. At CPUT, having identified that the CPUT's doctoral student throughput rates were poor and the successful completion of doctoral studies needed to be prioritized, a gap was identified with regard to the lack of supervision support between the more experienced supervisors (leading researchers/supervisors) and emerging researchers/supervisors. There is currently no guide for Novice Supervisors at CPUT. However, most faculties seem to require novice supervisors to co-supervise at least one student (possibly more) before taking on the role of principal supervisor. To this end, CPUT conceptualized, developed, and implemented a unique supervisory training model called the Sisonke Mentorship Programme (SSMP). This initiative is helping the institution with the development of a framework that supervisors will be able to follow at CPUT. The Learning Programme is based within CPUT's Research Development Directorate, and hence supervisors will have access to all the support structures available.

The SSMP aims to create a supervision programme to prepare emerging supervisors for the rigor of student supervision in a conducive and supportive environment. The purpose of the SSMP is to ensure that CPUT meets the national quality standards for Doctoral qualifications and to check that we comply with the CHE National Standard for Doctoral qualifications. The SSMP is also in line with global recommended approaches to mentoring novice supervisors [17]. It is hoped that the SSMP will contribute to enhancing the quality of supervision at CPUT. The mentoring programme speaks to the realization that supervision is not merely an academic practice, and through this collaborative process all participants together embrace much broader, and more inclusive skills such as:

- The mentors and mentees will be better prepared and more aware of, and sensitive to the importance of working with their students reflectively - reflecting on and in their spaces
- the mentors and mentees are able to transform their working space from a safe space to a brave space where trust underpins the student and supervisor/s relationship,
- The SSMP for mentors and mentees is a strong disciplinary, multidisciplinary, transdisciplinary, and interdisciplinary with participation across all faculties at CPUT such that inclusive communities of practice can be developed,
- Supervisors become aware of and are sensitive to the well-being and mental health of their postgraduate students; they are able to assist students in reaching their capabilities, be aware of the ethics of care and the benefits of the pedagogy of vulnerability,
- Supervisors use a basket of pedagogies and tools that include flexible virtual learning pathways, to benefit all parties,
- The supervisors and postgraduate students will also be better prepared and more aware of, and sensitive to the importance of working with their students in a reflective manner - reflecting on and in their spaces,
- Supervision for mentoring and postgraduate students becomes multi, trans, and/or interdisciplinary across all faculties at CPUT where inclusive communities of practice are developed,
- Supervisors use virtual learning pathways that will benefit all parties. These include hybrid supervision (combining face-to-face and online),
- SSMP is based within CPUT's Research Directorate, and hence supervisors receive all the support they need, and

- Ultimately it is hoped that this Learning Programme will contribute to more local and global Masters and Doctoral students registering at CPUT, experiencing a smooth research journey with an improved through-put rate, graduating within minimum/expected times, and returning as lecturers.

Ultimately, we project that this Learning Programme will contribute to more South African and international Master and Doctoral students registering at CPUT and experiencing a smooth research journey. We also anticipate that this programme will contribute to an improved throughput rate, graduating within expected timelines, and the return of graduates to academia. The overall aim is that through this programme we will emphasize the coaching supervision styles as explained above so as to encourage more collaborative research aligned to Mode 2 and 3 knowledge production and relevant, transdisciplinary research as motivated in V2030.

The consensus among seasoned supervisors at CPUT is that the Sisonke mentorship programme is a timely and critical programme that will help the institution develop an appropriate supervision pedagogy which can be embraced by novice supervisors for postgraduate supervision.

## **7 Enhancing Capacity: The case for academic and industry co-supervision**

The aforementioned challenges regarding adequate supervision of students at master's and doctoral level require a rethinking of what other avenues are available or can be exploited to enhance the research and output capacity at CPUT. Considering the historic and symbiotic relationship between Universities of Technology and industry, communities, professions, and commercial enterprises, it would be worthwhile to explore this option of industry supervision. This includes schools, health sectors, and other institutional partners. This can be an opportunity for CPUT as an engaged institution to work in collaboration with industry/ /Research Councils/laboratories attached to governmental entities (e.g., National Health Laboratory Service) and address real-world business and technology challenges across a variety of economic domains via industry supervision. At undergraduate level CPUT is already enjoying success in Service-Learning, Civic Engagement, Community Engagement and Work Integrated Learning. We can build on these models to include postgraduate level research projects.

Spreading postgraduate supervisory capacity beyond the campus fence-line by leveraging industry expertise, could, if properly managed and regulated, yield several benefits for the postgraduate students and academic supervisor. These include:

- Access to state-of-the-art laboratories, pilot plants, business processes, and other infrastructure for the research projects,
- Real-world know-how, competencies, and expertise from the industry co-supervisor,
- Possibility of 3<sup>rd</sup> Stream income from Intellectual Property generated from industry projects and/or serendipitous discoveries,
- Industry-relevant and authentic project topics/ applied research projects,
- Exposure to emerging industry trends/needs,
- Real-life applications and transferability of research findings,
- Possible co-funding of projects by industry,

- Opportunities to find a cost-effective way to drive relevant leading-edge research projects which you may not have the funding, expertise, or appropriate equipment to undertake,
- Enhanced knowledge transfer and networking between industry and academia, and
- Create a thriving environment for rapid economic growth through real-time research output ready for immediate market uptake.

Collaboration with academics at universities beyond the borders of South Africa, including research exchange visits can also fast-track the progress of the postgraduate student, in particular if the expertise and the facilities of the international partner augments any deficiencies at CPUT.

## 8 Efficiency and effectiveness of postgraduate supervision at CPUT

The proposals in this document are in support of the strategic intent to enhance or optimize research supervision for postgraduate students at CPUT. The document is informed by the idea that integrating factors deemed critical in positively influencing postgraduate students' supervision experience could lead to better postgraduate student throughputs and research outputs for the university. It is proposed then that the new approaches, where possible, should be implemented. In summary, the following are key:

- Institutional support for the supervisory processes,
- Impactful training and support for students and supervisors,
- Availability and deployment of resources to enhance pedagogy of research supervision e.g., training, workshops, funding etc; and
- Mentoring of novice supervisors by experienced supervisors.

**(a) Enablers** - Effective Student/Supervisor Memorandum of Understanding (MOU's) and interactions, training workshops, cross-disciplinary supervision, communities of practice (COP), appropriate and adequate resources (physical, online), monitoring and evaluation protocols, appropriate Policies and Procedures.

**(b) Activities** - Advanced communication skills training; innovative research approaches expertise and techniques; oral defence options.

## 9 Specific Recommendations

As we explore various and novel supervisory options as an institution, it will become more important to develop our own matrix of options or variables to address the respective needs of individual supervisors and postgraduate students [18]. The following activities are, therefore, recommended:

- **Review Policy on Postgraduate Education and Research NQF Levels 9 and 10** to ensure that the issues of research pedagogy and postgraduate education are clearly articulated. The findings or lessons shared during SSMP Workshops should be helpful when revisiting the policy with regard to supervision styles or research pedagogies
- **Promotion of alternative supervisory models** - Empirical as well as anecdotal evidence indicates that there is no one correct model of supervision that can be imposed on masters and doctoral pedagogy, see for example [8, 19]. CPUT should therefore ensure or socialize and make academics aware of the plethora of supervisory options which combine



various elements of good practice relevant to the specific student and research endeavours. Specifically, two approaches are recommended for CPUT:

- **The cohort/team model** should be considered and implemented wherever possible. It can also be appropriate for inter and or transdisciplinary research. However, this will not always be universally applicable as the panacea for the supervision process since the model will ultimately depend on the subject area/s. Overall, experience has shown healthy competition among peers with sound sharing of common practice, while providing collegiate solutions to research problems among scholars. The cohort model creates a community of scholars with multiple perspectives, students connect with one another, and they can inform and motivate one another, including learning from mutual strengths and mistakes [30]. However, the authors also caution that some students may not be team players, and others may not progress at the same pace, and those who lag behind may become demotivated. Scheduling meetings and workshops can also be problematic for the supervisor.
  - Investigate and promote the **supervisory support group model approach** which can also enhance supervisory impact/student success, skills and knowledge, and graduate attributes. Specifically, activities such as inter-faculty student seminars, and postgraduates (including postdoctoral fellows) research conferences (at least two a year to expose students to transdisciplinarity to go beyond their narrow research field). The support group coordinated by the main supervisor where all postgraduate students, supervisors, and past students (who want to continue with their studies) are to be organised every month to create a classroom environment (since postgraduate studies are often a lonely journey). Matters for discussion could include proposals and thesis chapters submitted to the supervisors so that everyone can benefit from the feedback and give their input.
- Inculcate amongst CPUT postgraduate students and supervisors the importance of attaining the **graduate attributes** as part of the student journey as a researcher and the quality of master's and doctoral qualifications. Monitoring and assessment of graduate attributes will be executed by the Centre for Postgraduate Studies (CPGS).
  - **Prioritise cross-disciplinary** (i.e., multi, trans, or Inter-disciplinary options) as a strategy that can enrich the postgraduate experience by exposing the student to broader supervisory experiences and disciplinary traditions. This was also highlighted in the CHE Doctoral National Report 2022 (page 70) as an example of good practice that can be emulated by universities.
  - Expand CPUT supervisory capacity **via leveraging industry expertise**, especially in the sciences and engineering disciplines where opportunities to undertake leading-edge research using relevant expertise or equipment may not be available at the university.
  - **Expand the base of technical and academic mentors** available to the students by facilitating the appointment of post-doctoral staff and even "visiting professors". The current approach of utilising the skills of retired professors to provide postgraduate supervision capacity is yielding some positive results, although the approach may not be sustainable in the long run.

- **Streamline all administrative aspects** e.g., steps for the submission on the Higher Degrees Committee (HDC) digital platform, procurement processes for equipment, etc.
- **Invest in technical staff** that can ensure delivery of perfect service in the laboratories, i.e., sufficient manpower to supervise and assist with the use of sensitive equipment and are able to minutely perform routine and preventative maintenance.

## 10 Envisaged outcomes and long-term impact

It is envisaged that if some of the proposed novel variations of the supervision are implemented, depending on appropriateness and willingness on the part of supervisors and students, the following outcomes will be achieved:

- Effective and impactful postgraduate supervision,
- Relevant, quality research,
- Improved/timely completion rates,
- Quality research outputs,
- Achievement of world class graduate attributes, and
- Portable skills.

In terms of long-term impact, there is a creation of a sustainable pipeline of well-trained researchers and scholars who are able to contribute effectively and efficiently to the Academic Agenda of CPUT in terms of teaching, research, innovation, and community engagement as informed by V2030 and other institutional imperatives now and into the future.

## 11 Conclusion

National and global experience has yielded a strong and unequivocal message that there is no correct model for postgraduate supervision and institutions should resist imposition or being prescriptive. However, supervisors and postgraduate students must be made aware of the range of possibilities of supervision models and be encouraged to, where possible, combine various elements of good practice relevant to the particular student, discipline, and type of project [13]. Specifically, innovative models such as cohort supervision tend to offer several benefits and opportunities for postgraduate students, the supervisory team, and novice supervisors. This model can be effective in building a community of researchers through the giving and receiving of support, feedback, and guidance from a wide variety of sources. Cohort supervision can be an enriched learning environment offering peer support and supervision teams where peers, postdoctoral scholars, non-supervising collaborators, and external experts all engage to enrich the supervision experience and process.



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