The praxis of cohort supervision in a comprehensive open distance e-learning university: A conceptual framework

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Abstract

The challenges posed by underprepared doctoral students and low throughput rates within the South African higher education context have led to the need for alternative supervision approaches. Due to the nature of the only comprehensive open distance e-learning university (CODeL) in South Africa, students more easily experience feelings of isolation, lack of motivation, and time management issues that affect the successful completion of their studies. A possible solution to advance the completion of doctoral qualifications is the use of cohort supervision. Due to its structured nature and its potential to promote student participation in the research process, the use of cohort supervision is explored in this article. The proposal is based on an analysis of existing literature to propose a heuristic cohort supervision framework focussed on assisting and motivating students through the stages of proposal completion, data generation, data analysis, and composition of the expected research product. The framework emphasises the creation of opportunities for collaboration, communities of practice, dialogue, reflection, scaffolding, sequential cumulative development, and enculturation. The proposed framework for cohort supervision is a starting point for further research that may link supervision theory and practice in meaningful ways in a CODeL university and a broader higher education context.

Keywords: cohort supervision; collaboration; distance education; online learning; technology

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Introduction

The pressure on higher education institutions to contribute to the knowledge economy through increased doctoral research outputs is ever increasing. In the South African context, producing doctoral students is a national priority, as the country needs researchers to drive growth and development (De Lange et al., 2011). Increasing the number of doctoral studies aligns with the key priority areas of the

2030 National Development Plan (South African Government, 2019) and the Sustainable Development Goals (United Nations, 2019), which require research-driven action to promote prosperity for people and the planet. Emphasising the increase in doctoral degrees is aligned with using knowledge as a powerful economic commodity for countries striving toward economic advancement (Fourie-Malherbe et al., 2016). To support socio-economic development, universities must focus on expanding new capabilities and innovation through research (Youtie & Shapira, 2008), not only by increasing the number of doctoral students but also by enhancing the quality of research outputs and the number of early career researchers (Mouton et al., 2019).

However, Swarts (2017) explains that increasing the number of doctoral studies to meet the quota set within the South African National Development Plan 2030 is a complex process. The goal of graduating more than 100 PhD students per million people annually by 2030 (South African Government, 2019) is challenging, given that universities currently produce only an average of 54 doctoral students per annum (Department of Higher Education and Training, 2023). The struggle to increase the number of doctoral students is often attributed to historical circumstances in which previously disadvantaged students have not received quality education (Department of Higher Education and Training, 2018). Poor writing skills, inadequate language proficiency, lack of access to technological tools, and limited knowledge of methodological content further hinder the progress of doctoral students in completing their degrees (Van Biljon et al., 2014; Heeralal, 2015; Manyike, 2017). Within a comprehensive open distance e-learning (CODeL) university, the pressure on supervisors to support doctoral students is compounded by the nature of the institution (Gumbo, 2019).

The CODeL university focusses on offering accessible, high-quality education to students who may not be able to attend traditional campus-based programmes (Van der Merwe, 2022). The strategic emphasis of the university is to produce excellent research through intellectual ingenuity and novel solutions to societal problems (Crous, 2024). Achieving this institutional strategy requires supervisors to provide what Gumbo (2019) refers to as a "lifeline that crystallises supervision from a botho perspective" (p. 94), focussing on interconnectivity, communalism, and personhood (Sodi et al., 2021). Therefore, supervisors are expected to provide functional support, mentoring, academic writing assistance, emotional encouragement, and guidance to increase research output (Bastalich, 2017; Fynn & Janse van Vuuren, 2017). Heeralal (2015), Manyike (2017), and Swarts (2017) argue that the demands on supervisors to support doctoral students require a review of the supervision approaches used. The traditional one-on-one supervision approach no longer provides the context needed to drive success in supervision and doctoral completions. More structured approaches to supervision

are required and should be explored to ensure that doctoral students complete their studies successfully, especially within a CODeL university (Glove, 2010; Govender & Dhunpath, 2011; Gumbo, 2019).

Contextualising the research

Understanding the CODeL (Comprehensive Open Distance and E-Learning) principles of the university is crucial to contextualising the need for alternative assessment practices. In the context of 'comprehensiveness,' the qualifications offered are multidimensional, dealing with different research taxonomies. Comprehensiveness is not just about varied qualifications, but also the absorption of knowledge to become global citizens, actively involved in the formation of our societies (Crous, 2023). 'Openness' requires providing opportunities to engage with others, which is vital for offering students from diverse educational and socio-economic backgrounds the opportunity to pursue further and lifelong learning (Manyike, 2017). Openness also involves sharing information, experiences, and critique through digital media. A student-centred approach must be followed, with flexible learning provisions and programmes that meet students' expectations and support their academic success.

'Distance learning' refers to a mode of education delivery in which there are temporal, spatial, economic, social, educational, and communication distances between students and supervisors (Van Biljon et al., 2014; Heeralal, 2015). Burford, McChesney, Frick and Khoo (2024) focus on the concept of distance within doctoral education as flexible and multi-faceted, highlighting that it signals a geographic element (completing all or part of a study away from the physical site of the institution), as a pathway to the doctorate (off-campus, hybrid and remote), and a form of agency (by necessity or choice). Distance learning encompasses a 'metaverse' where students and supervisors can interact through different realities to gain experiences as they would find them in the real world.

'E-learning' relates to the use of technology in the learning and teaching environment to develop independent, self-directed, and reflective students (Van Rooy & Madiope, 2012). E-learning introduces a new dimension to the concept of open distance learning by overcoming traditional barriers to education. The possibilities of unlimited access to information and global communication provided by e-learning enable students to control and direct their own learning. To promote e-learning, the CODeL framework is founded on the premise that student learning can be optimally supported by modern electronic technologies. Multiple teaching and learning strategies and a range of technologies are used, combined with the deployment of physical and virtual resources to encourage active student

engagement (Heeralal, 2015). In a CODeL university, the emphasis is on using technology to bridge temporal, geographical, economic, and communication barriers, advancing a fluid open learning environment toward lifelong learning (Mbatha & Naidoo, 2010). The CODeL model uses technology to improve open educational practices that promote a more structured environment for student participation.

Through openness and e-learning opportunities, supervision support should be provided to doctoral students. Van Biljon and De Villiers (2013), Van Biljon et al. (2014), and Heeralal (2015) propose that supervision practices in the CODeL university should be adapted to provide a more structured approach, based on scaffolded learning, cooperative learning principles, collaboration, and reflection. These recommendations align closely with the description of cohort supervision proposed by Choy et al. (2015), Cornér et al. (2017), and Bertone and Green (2018). Therefore, the focus of this article is to propose a cohort supervision framework to accommodate the demands of online distance e-learning doctoral supervision, addressing the following main question: *How can the cohort supervision framework be conceptualised as supervision pedagogy in a comprehensive open distance e-learning education context?* This question is explored through a literature review and proposing a framework that may be applied to advance cohort supervision in a CODeL university.

Overview of supervision approaches

Authors such as Van Biljon and De Villiers (2013), Choy et al. (2015), and Gumbo (2019) argue that alternative supervision approaches must be considered to create a supervision infrastructure in a CODeL university that optimally supports doctoral students. Proposing such an approach requires a brief exploration of existing supervision practices.

The most common supervision approach is the apprenticeship approach (McCallin & Nayar, 2012). The strength of the apprenticeship approach is that it provides students with highly individualised attention, potentially resulting in significant personal growth (Loureiro et al., 2010). In this approach, the supervisor acts as a mentor, offering encouragement, support, and guidance to stimulate the student's acquisition of knowledge (Burnett, 1999). However, due to ever-increasing student numbers, this approach has faced criticism for its reliance on one-on-one interaction (Bertone & Green, 2018). Issues such as power struggles, lack of individual feedback, and insufficient support limit the effectiveness of the apprenticeship approach (Cornér et al., 2017).

Group supervision approaches, whether many-to-one or one-to-many, aim to move away from traditional supervision by providing more opportunities for engagement. This mixed approach allows for multiple supervisor-student relationships (McCallin & Nayar, 2012). Group supervision may involve more than one supervisor per student or supervision via an advisory or supervisory committee, where a candidate is supervised by a committee of three to five academic staff members (De Lange et al., 2011). Group supervision can add value by incorporating the experiences, knowledge, and skills of various members in the student's research project (Van Biljon & De Villiers, 2013). However, criticism of this type of supervision highlights potential imbalances in power relationships that may negatively impact the development of the doctoral student (Loureiro et al., 2010). Conflict between supervisors can alienate the student, as inconsistent, contradictory, and confusing feedback may stifle progress and diminish motivation, leading to low throughput and high attrition rates (Van Biljon & De Villiers, 2013).

The hybrid approach uses new technologies to encourage participation. It involves communities of people who are intellectually, socially, and geographically dispersed, but who work collaboratively through various technological tools (McCallin & Nayar, 2012). This approach strengthens the relationship between students and supervisors by providing opportunities for participation, feedback, discussion, and support. Like group supervision, the hybrid approach can be loosely structured. Students, supervisors, and experts can participate in an online session on a topic with which students are struggling, and once the necessary knowledge is obtained, the group may not be required to engage (Choy et al., 2015). Access to technology and technological tools is essential to successfully execute this supervision approach (Swarts, 2017).

Although these supervision approaches include more individuals than just the supervisor and student, a concerted effort is required to transform supervision practices into a more structured and team-supported effort (De Lange et al., 2011; Samuel & Vithal, 2011). For this reason, the cohort approach to supervision is proposed as a viable alternative. The cohort approach promotes collaborative and interactive learning through a structured programme (Govender & Dhunpath, 2011). Cohorts have defined long-term membership and a shared common goal that can be achieved through scaffolding learning, where members support each other academically and emotionally. They follow a highly structured and intense meeting schedule, forming a network of synergistic learning relationships over time, which are shared among group members (Choy et al., 2015). Cohort supervision encompasses a community of students, supervisors, and experts where students commit not only to their own studies but also to each other (Samuel & Vithal, 2011). Furthermore, cohort supervision is a form of collective supervision in which

students follow a similar development plan and are supervised by the same faculty members throughout the learning experience (Agné & Mörkenstam, 2018).

Although cohort supervision can support and encourage students to complete their research, the approach has areas of concern. Govender and Dhunpath (2011) explain that one key consideration is managing feedback from various supervisors. Conflicting and contradictory advice should be settled among supervisors without involving the student to avoid compromising student progress. Dialogue should be carefully managed to ensure that the views of some individuals do not overpower or negatively influence other cohort members. Establishing and maintaining a research culture where all cohort members' voices are equally important is necessary (Wisker et al., 2007). Supervisors must make a concerted effort to use dialogue forums or collaborative discussions to provide each cohort member with the opportunity to actively participate in the process (Harrison & Grant, 2015). Cohort supervision helps participants stay motivated, maintain momentum, comment on work in progress, and receive a critique of their research to support progression.

Theorising on cohort supervision in a CODeL environment

The purpose of cohort supervision is to create opportunities for collaboration, support, and guidance to students, supervisors, and other experts throughout the research process (Samuel & Vithal, 2011; Santicola & Morris, 2013). When considering this alternative supervision approach, Heeralal (2015) calls for supervision pedagogy to be flexible in promoting participation with students, founded on the principles of group participation, participation in communities of practice, open and honest dialogue, and a balanced power relationship (Agné & Mörkenstram, 2018; Robertson, 2019).

In a CODeL environment, students and supervisors are not only geographically separated, but may also have trouble connecting socially and culturally through technology-mediated learning environments (Maritz, 2013). In the context of little or no face-to-face interaction, technology should be used to enable a fluid open research environment that promotes access to resources, social interaction, emotional support, and the expansion of research knowledge (Mbatha & Naidoo, 2010). Cohort supervision in the context of a CODeL university can thus be described as a supervision approach in which a community of students and academics participate in the achievement of similar goals through the application of various technology tools to provide support; promote progression; and encourage peer learning, regular feedback, and learning from the experiences and viewpoints offered by others. Online engagement should promote community engagement and

the enculturation of students into professional communities of practice. Trusting relationships are required to create opportunities for students to collaborate in problem-solving activities, engage in critique, and take risks to improve the quality of their research outputs.

Although there is strong advocacy for the development of such cohort supervision practices in a CODeL university (De Lange et al., 2011; Choy et al., 2015; Van Biljon et al., 2019), there is little commentary on the framework that may be used to implement such a supervision approach. Ravitch and Riggan (2017) as well as Ngulube (2018) explain that it is important to consider related theories when building a heuristic framework for considering a solution to a research problem. Two theoretical points of departure inform considerations toward a proposed cohort supervision framework for a CODeL university. The first relates to the typology of research supervision (Lee, 2008), while the second focusses on the community of inquiry theory (Garrison et al., 2000).

The typology of research supervision theory by Lee (2008) is founded on the approaches of functionality, enculturation, critical thinking, emancipation, and quality relationships. Functionality refers to a series of guides to encourage progression toward the completion of the research output. Enculturation relates to preparing students to become a member of a discipline through role modelling and apprenticeship. Critical thinking involves encouraging the development of critical analysis, argument formulation, and evaluation skills. Emancipation focusses on mentoring students and facilitating reflection toward personal growth. Relationship development requires the application of emotional intelligence to manage a collection of relationships (Lee, 2010). In a CODeL environment, each of the five components within the typology is necessary to assist in negotiating the achievement of doctoral degrees (Swarts, 2017).

Additionally, the community-of-investigation theory of Garrison et al. (2000) aims to provide a dynamic educational context to inform online learning in higher education. The theory has at its core key constructs related to cognitive, teaching, and social presence that support the online educational experience. Cognitive presence refers to creating opportunities to improve critical thinking where students are encouraged to question and analyse not just their own work, but also that of their peers (Garrison et al., 2000). The emphasis is on scaffolded learning, where students work collectively on different aspects of their learning and knowledge development (Heeralal, 2015). Knowledge of the methodological content is imperative to ensure that students can defend methodological decisions and validate the quality of their research.

Providing cognitive learning in an online environment requires a structured process, where specific technological tools support the achievement of learning goals. Swarts (2017) refers to this as creating an active learning environment, where

supervisors, called 'teachers,' guide and assist students in solving research problems. The functional approach mentioned by Lee (2018) is related to the teaching presence proposed by Garrison et al. (2000), where supervision is provided toward the achievement of specific goals that can be used to measure progress and milestones. Supervision is required to stimulate intellectual rigour, offer opportunities to explore different ways of thinking, and encourage students to analyse and recognise flaws in their research arguments (Lee, 2018).

Based on the inquiry theory of Garrison et al. (2000), the final component of effective online supervision and participation requires a social presence, where both supervisors and students engage synchronously and asynchronously with each other to stimulate dialogue. This aligns with Lee's (2018) view that group participation plays an important role in facilitating learning. Communities of practice are required to encourage a sense of belonging, or enculturation (Samara, 2006). This enculturation is important in the cohort, as it emphasises the importance of the group structure to provide learning direction (Lee, 2018). Social interaction is required to promote emancipation, where students learn to become autonomous by discovering their personal voices among those who participate in the cohort (Lee, 2018). The components of both theories were considered in developing a cohort supervision framework applicable in a CODeL university in South Africa.

Research methodology

Following the theoretical points of departure towards proposing cohort supervision in a CODeL context, a bricolage design was adopted to create an epistemological context. Bricolage neither searches for new tools nor is it founded on a simplistic linear research process; rather, it is emergent and uses what is available to attain new insights (Mahlomaholo, 2013). Toward this end, the existing literature that could inform the cohort supervision framework was reviewed. Following a heuristic inductive approach in the bricolage design, the literature review involved identifying, locating, synthesising, and analysing concepts applicable to the research topic (Maguire & Delahunt, 2017). The focus was on identifying patterns within the literature that could be used to identify components of the proposed cohort supervision framework applicable to the CODeL university. Database searches were performed using key phrases relevant to higher education supervision in a CODeL university in South Africa, including the following:

- Cohort “AND” Supervision
- Supervision "AND" CODeL “AND” Cohort
- Cohort “AND” Supervision “AND” South Africa

- Supervision "AND" Distance "AND" Education
- Supervision "AND" Types
- Alternative "AND" Supervision "AND" Methods
- Supervision "AND" Technology

During these database searches, the date range was set from 1997 to 2022 to accommodate articles of relevance aligned with the changes in higher education in South Africa after democracy, as promulgated by the Higher Education Act 101 of 1997 (South African Government, 2024). Databases including *Academia.edu, EBSCOhost, Google Scholar, Proquest, Research Gate, Sabinet* (specifically African Journals, previously known as *SAePublications*)*, Scopus, Springerlink, Taylor & Francis,* and the *Web of Science* yielded 148 articles of interest, excluding duplicate articles. Once the initial number of units of analysis was identified, judgemental sampling was used to refine the sample of articles. Judgemental sampling was deemed necessary, as not all articles identified during the initial search applied to the topic of the examination. Bless et al. (2013) explain that the purpose of judgemental sampling is to identify sources with the most representative element—in this case, cohort supervision in a CODeL context. Winnowing was applied to execute the judgemental sampling method. The abstracts of the articles were examined for direct relevance to the research topic. Through the winnowing process, 34 sources were selected and analysed. The selected articles represent countries from all over the world; namely South Africa (n=18), Australia (n=6), Europe (n=4), United Kingdom (n=4) and the United States of America (n=2). Given that most of the articles relate to those published in South Africa, one can argue that the reason may be the specific use of the term CODeL. Articles identified from other countries may have included terms such as cohort and distance education but not CODeL, which may be the reason for fewer international articles being selected. Using latent thematic identification, where the aim was to examine underlying ideas, assumptions, and conceptualisations, components were identified and reviewed to create a construct that may provide answers to the main research question (Maguire & Delahunt, 2017). A heuristic approach was followed to discover key steps or components to consider in the establishment of a structured cohort supervision framework.

Literature review

Contextualising the need for a cohort supervision framework in a CODeL university, the character of higher education in South Africa provided the basis for the analysis. At the beginning of 1994, with the advent of democracy, the South

African higher education infrastructure was fragmented and uncoordinated. Legislation such as the Higher Education Act, No. 101 of 1997 (South African Government, 2024), contributed to major changes in the formation of new higher education institutions such as the CODeL university. Although optimism reigned during the first 10 years of democracy that access to and quality of higher education opportunities would expand, the Council on Higher Education (CHE) (2016) argues that the reality did not reflect the expectation. Reviewing progress in higher education after the first 10 years of democracy showed concerns about the retention of staff in higher education institutions and the worsening student-to-staff ratios. The increasing demand for higher education was not met by an equally growing academic staff complement (CHE, 2016). Sandeen (2014) and Bunce et al. (2016) explain that the doctoral student to supervisor ratios increased, with less experienced supervisors being available to supervise postgraduate students. Students entering doctoral programmes were also seen to have limited methodological knowledge, language proficiencies, and writing skills (Akala & Akala, 2023). The growing number of underprepared students enroling in doctoral degrees placed a burden on supervisors to assist doctoral students in completing their qualifications. Considering the number of doctoral students enroled at the CODeL university in South Africa, which totals approximately 8,000 in 2024 (Unisa, 2024), a concerted effort is needed to offer support to these students to complete their qualifications (Akala & Akala, 2023).

Toward establishing a cohort supervision framework that considers issues experienced by doctoral students, various authors propose a formal structure where students and supervisors participate in the development of methodological knowledge, as well as the research process to achieve research results (Van Biljon et al., 2014; Wichmann-Hansen et al., 2015). Samuel and Vithal (2011) suggest three phases: refining the research design, engaging with the production of data within the field, and compiling the thesis report. De Lange et al. (2011) propose a similar structure where supervision sessions are carefully organised to focus on aspects of research, presentation of work, critique, and feedback by peers and supervisors. To ensure that a structured approach is followed, multiple stakeholders must become involved in the supervision relationship (Van Biljon & De Kock, 2011). These stakeholders include but are not limited to supervisors with varied skills, students from one or different but related disciplines, administrative staff, librarians, industry experts and ICT support. What binds stakeholders together in a cohort pedagogy is the fact that they work collaboratively to develop research capabilities and support scholarly autonomy (De Lange et al., 2011). Inclusion of multiple stakeholders calls for fluidity of roles and responsibilities (Winberg & Winberg, 2018) that are defined and redefined according to the ultimate outcome of the cohort supervision process.

As part of the structure of the proposed cohort supervision approach, participants in the cohort should set research goals and milestones that can be achieved during various phases of the supervision process (Glover, 2010). Achieving these goals and milestones requires that supervisors and students participate in several activities such as workshops, presentations, and feedback sessions to cultivate cognitive engagement. Learning opportunities can range from orientation and communication of expectations to coaching, task support, and expert input on theoretical and practical topics (Samuel & Vithal, 2011).

With the cohort, stakeholders should have opportunities to engage in empirical observations and feedback. Students should be encouraged to take the lead and support each other through cooperative learning practices founded on the principles of collaborative learning, academic controversy, and group investigations (Glover, 2010). As explained by Agné and Mörkenstam (2018), the skills needed to create something as complex as research are sometimes communicated more effectively through collaborative engagements.

Such engagement is needed at various stages of the research journey to offer support, stimulating the development of critical thinking, critiquing, reflective skills, and the development of quality relationships (Lee, 2008). Feedback and reflection are required to ensure that students actively partake in the process of engaging in constructive critique (Burnett, 1999; Dysthe et al., 2007). Feedback and engagement require extensive use of technology tools to effectively promote communication and the continuous engagement with and between stakeholders of the cohort (supervisors, students, and experts). Especially within a distance education context, effective communication is imperative, to provide a safe environment in which research outputs can be shared in a sensitive and respectful manner (Wichmann-Hansen et al., 2015). Collaboration must be strengthened through communities of practice. Such communities of practices should include cohort stakeholders that come together to find value in the learning experience. Dialogue and communication within the community of practice should support students beyond the immediate achievement of milestones, to cultivate a much-needed community of researchers (De Lange et al., 2011). Technology that can be used to encourage communication, feedback, and engagement include Teams spaces to share information, online defences to prepare students for viva voce, massive online open courses (MOOCs) where students can learn from others more knowledgeable than them, online workshops and webinars, and regular online discussions to follow up and engage on progress towards the completion of chapters.

To summarise: Cohort supervision focusses on building relationships, dialogue, reflection, and communities of practice. Engagement is reliant on effective communication to create a supportive environment for advancing research

outputs. The community of practice should encourage collaboration among role players to cultivate a robust community of researchers. A structured approach should be followed in cohort supervision, including setting research goals, milestones, and participating in activities such as workshops, presentations, and feedback sessions to foster cognitive engagement. Cooperative learning principles and peer learning are highlighted as essential for stimulating research activities and skill development. Technology tools are crucial for continuous engagement, with online platforms that facilitate communication, feedback, and collaborative learning. Supervisors and peers should be involved in developing methodological knowledge and research skills through various phases, including research design, data production, and thesis writing. This approach emphasises collaborative stakeholder participation, where roles are fluid to support research capabilities and scholarly autonomy.

A proposed cohort supervision framework for a CODEL university in South Africa

Drawing on the existing literature and the components identified in the relevant theoretical frameworks, a four-stage cohort supervision framework for a CODeL university is suggested in Figure 1.

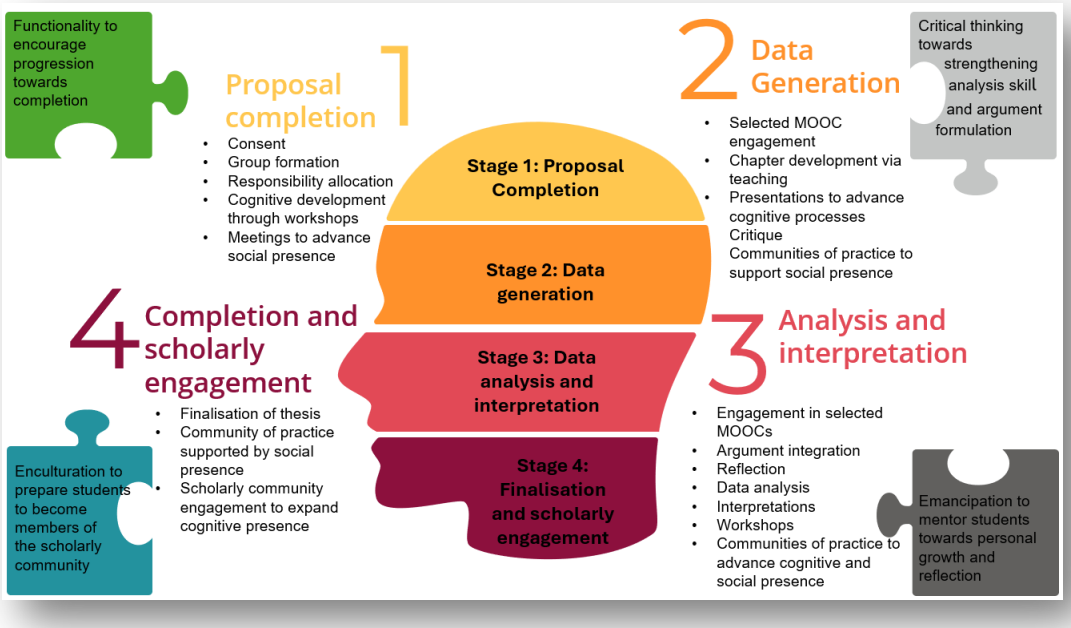

Figure 1. Proposed four-stage cohort supervision framework in CODeL

According to Figure 1, the framework comprises four stages, including the completion of the proposal, data generation, analysis and interpretation, and completion and scholarly engagement. These stages act as cornerstones as proposed by Lee (2008) in the typology of research supervision theory where functionality, critical thinking, emancipation, and enculturation act as a jigsaw puzzle to ensure a comprehensive and coherent context for supervision practices. Committed, knowledgeable, and experienced supervisors are needed to execute the proposed stages of the cohort supervision model. As there are various ways in which supervisors can collaborate in the cohort approach, a one-size-fits-all method is not recommended. For example, at the CODeL university, supervisors who support doctoral students with similar topics may opt to work together. As part of the value offered by the CODeL university towards the achievement of national development goals, students are encouraged to focus on research related to catalytic niche areas inclusive of marine studies, aviation, energy, space study, fourth industrial revolution and digitisation, natural sciences, health studies, feminist, womanist, Bosadi Theorisation, as well as student support and co-curricular activities (Unisa, 2023). In instances where students from various disciplines focus on a specific catalytic niche area, supervisors can create a cohort to encourage interdisciplinary collaboration, learning, and engagement. Supervisors may also decide to establish cohorts based on similar methodological approaches within a department or decide to work as a single supervisor with various students in a cohort.

Wisker et al. (2021), Lee (2018), and Gumbo (2019) argue that for supervisors to flourish in a cohort supervision context, they are required to display subject matter expertise, have strong communication and project management skills, be emotionally intelligent, embrace diversity, be flexible and innovative to manage the cohort process, and display strong administrative skills to document and keep track of students' progress. When more than one supervisor is involved in the cohort, a lead supervisor should be appointed. It is the responsibility of this lead supervisor to implement the phases of the cohort supervision process and act as the coordinator to ensure the smooth functioning of the cohort (Heeralal, 2015). Wisker et al. (2021) opine that the lead supervisor is required to evaluate the environment in which supervision occurs, organise engagement sessions, act to resolve challenges, and ensure the optimal participation of all members of the cohort to create a community of practice. In instances where there is more than one supervisor involved in the cohort supervision, all supervisors are responsible for encouraging dialogue, active reflection, and the application of strategies to support doctoral students. Timeous written and verbal feedback is needed, as well as participation through various activities and technologies to advance the writing, analysis, and critical thinking skills of students. As cohort supervision is often new to supervisors

and students, time, patience, and commitment is needed to ensure its success (Glover, 2010).

To prepare supervisors to improve and advance supervision practices, the CODeL University through its Graduate Studies College offers a postgraduate research programme (Unisa, 2024). As part of the programme, various typologies of supervision are explored as well as skills and competencies required from supervisors to guide doctoral students successfully to completion. Since 2022, it is mandatory for all supervisors to complete the training. Supervisors at the CODeL university should therefore have the foundational knowledge to enable them to explore alternative supervision practices, such as cohort supervision.

During the ***first stage*** of the proposed cohort supervision approach, the creation of an infrastructure is needed to carry out cohort supervision. This infrastructure not only refers to the virtual space where students and supervisors will meet, but also to identify those who will be involved in the cohort supervision process. As potential doctoral students at the CODeL university can only apply and register for a degree at the beginning of an academic year (January–March), the creation of cohort supervision structures can be linked to this enrolment period. Another note of importance is that until recently (Unisa 2023), doctoral students could only engage in the completion of full research theses to complete their degrees. There was no alternative option to complete the degree through publications. Once doctoral students have applied, their initial research proposals are shared among supervisors that are experts in their respective topics. Supervisors select students that they would like to supervise and, through an administrative process, selected students are allocated to a supervisor. As the CODeL university is contextualised by law in South Africa as a distance education institution (South African Government, 2019), students are allowed more time to complete their studies than those who study at residential universities. On average, doctoral students engage in their research for a period of five years.

Once students are registered, they are required to register their institutional e-mail addresses and access tutorial material that provides details on the expectations of doctoral students and the research process. Supervisors should initiate communication and encourage their students to join the cohort group (Maor & Curry, 2017). Supervisors should obtain the consent of students to be included in the cohort group. The lead supervisors must establish the context of the cohort, based on areas of interest or research phases, and work collaboratively with other members to create a cohort group that will support and encourage each other. The apprenticeship approach can be combined with the cohort supervision approach, where a guardian supervisor guides the shift toward a more collaborative approach (Samuel & Mariaye, 2016). In terms of cohort size, De Lange et al. (2011) recommend that the ideal number of students should be between 12 and 18 students

in a cohort with three to four supervisors per cohort. This is, however, not prescriptive, and in the CODeL university, the decision on the number of students to involve in a cohort is left to the supervisors.

Once a cohort has been established, the lead supervisor informs students and supervisors about workshops and regular meeting schedules. This can be done through a learning management system or the Microsoft Outlook calendar function. Linked to the CODeL university, the first stage is used to connect cohort group members online and provide resources through information technology tools such as Teams, Google Docs, WhatsApp, and e-mail (Van Biljon et al., 2014). Gumbo (2019) is of the opinion that technology is crucial in cohort supervision to advance progression. Synchronous Microsoft Teams meetings, asynchronous videos, webinars, presentations on methodology topics, formulation of a proposal, or the use of automated referencing software can be used to share information and encourage engagement (Picard et al., 2011).

What is important during the first stage is that supervisors acknowledge the dependence of students (Choy et al., 2015). This dependency requires that supervisors set clear research goals, contextualise the skills and knowledge required to complete the doctoral degree, and provide the infrastructure for collaboration. Systemic support in this first stage is imperative to ensure that students obtain the administrative and technological support necessary to complete the registration process and to become aware of the workings of the cohort supervision approach (Fynn & Janse van Vuuren, 2017).

During the first stage, workshops can be organised to assist students in identifying research problems, deciding on methodological pathways, enhancing academic writing skills, learning about reference techniques, and exposing them to the components needed to compile research proposals. In an online environment, workshops and meetings can be facilitated by using video conferencing such as Skype, Zoom and/or Facebook live streaming, or tools such as Elluminate or Wimba that aim to share presentations and live chats (Maor & Curry, 2017). Similarly, these tools can be used to provide feedback on student presentations, where supervisors, as well as peers, comment and assist each other in working through challenges in the writing of research proposals. Reflection, either through blogging and/or sharing experiences in meetings, can assist students in assessing their progress and determine areas where more improvement may be required (De Lange et al., 2011). During this first stage, Bastalich (2017) argues that supervisors should apply content and context learning. In as much as doctoral students should be exposed to key information related to methodology, language skills, and writing skills, they should also be taught how to engage in a group setting, apply critical thinking to review the work or others, and critically analyse and interpret information presented in authoritative sources.

The ***second stage*** focusses on data generation. Here, the emphasis is on assisting students to complete key chapters of the research output and to strengthen their community-of-practice relationships by offering each other support and encouragement. Completing chapters towards a thesis requires access to information as well as additional knowledge on how to write various research chapters. An online cloud space can be created where supervisors and students share interesting resources as well as their draft papers (Maor & Currie, 2017). The value of creating such a collaborative space is that students learn to support each other through reading and critiquing the work of others.

Furthermore, students in a cohort can be encouraged to participate in MOOCs, approved by cohort supervisors (Maor & Currie, 2017; Agné & Mörkenstam, 2018; Deacon, 2018). During stage two, students should be encouraged to enrol in MOOCs that focus on key topics related to theoretical and conceptual frameworks, writing a literature review, and research methodologies. By encouraging students to participate in MOOCs, the scaffolded approach to learning is applied, where opportunities for learning are created as building blocks for students to improve their skills (Schulze, 2011). In addition to selected external MOOCs, the CODeL university offers a range of MOOCs on different types of research methodologies and students are encouraged to enrol for these.

Based on the knowledge obtained through MOOCs, students can be encouraged to develop and share their research output with the cohort during scheduled presentation meetings. To encourage emancipation, students and supervisors may read and provide input into the submitted research outputs (Agné & Mörkenstam, 2018). Because this may be a cumbersome task for students in a cohort with many participants, Burnett (1999) proposed that two other students in the cohort provide feedback. Ensuring that this process remains objective and that all students benefit from this practice, clear guidelines should be provided to students and supervisors within the cohort on the way feedback should be presented (Wichmann-Hansen et al., 2015; Rouse, 2023). From a dialogic point of view, feedback must involve active participation, discussions, and reflection (Dysteh et al., 2007). Technology tools that can advance communication and feedback in stage two may vary from the use of WhatsApp or ooVoo, to instant messaging and communication via video calling and online communication tools, such as FaceTime and Viber to encourage dialogue. Chapters, analyses, and interpretations of findings can be shared in the online space through tools such as Teams, Google Docs, Wikis, Dropbox, or OneDrive. To comply with the copyright and plagiarism policies of the CODeL university, students are required to use similarity detection software such as Turnitin (Maor & Currie, 2017).

The focus of the ***third stage*** is to assist students in analysing and interpreting the data. Students can participate in online classes offered by, for example, the

College of Graduate Studies, to use data analysis tools such as ATLAS.ti and SPSS. Students can also participate in MOOCs proposed by supervisors and experts to strengthen their analytical and academic writing skills. Online workshops to discuss findings are important to inculcate a culture of critical thinking and analysis.

During stage three, students should become self-directed and self-regulated. McKenna (2017) states that due to complications in completing the final stages of the investigation, the relationships between members of the cohort should be closer than ever. Dialogue remains imperative and becomes the main form of support for students (Dysthe et al., 2007). Dialogue through the community of practice will help students develop as autonomous agents who can confidently communicate their views and opinions within the safety provided by the cohort community.

The fourth and ***final stage*** focusses on helping students complete their final research products and become members of disciplinary communities. Enculturation and emancipation should be prioritized, so that students can become researchers and knowledge producers through a variety of activities, including peer review, oral presentations, research defence reflection, and the final completion of the thesis (Picard et al., 2011). The functional element of the typology of the supervision theory of Lee (2008) is particularly important to support the conclusion of the research process. Functionality provides a set of tasks that a student should complete towards the finalisation of the research product. It includes monitoring progress in compiling the research product, ensuring editorial and language alignment with institutional guidelines, and compliance with institutional plagiarism policies. Using cloud storage spaces where chapters can be shared, feedback can be provided, and progress monitored, a collective space can be created where participants can share their progress.

Throughout the stages, but particularly in stage four, students should be nurtured to become active members of a scholarly community. This can be achieved through a scaffolded process, where students are encouraged to participate in the scholarly community through presentations on postgraduate forums via Skype, video conferencing, or Facebook live streaming. Students should be encouraged to prepare presentations of their research for conferences and submit articles to accredited journals, to receive acknowledgement as scholars in their discipline (Winberg & Winberg, 2018). By encouraging students to engage in the scholarly community, a much-needed community of researchers will be cultivated (De Lange et al., 2011).

Concluding remarks

The foundation of the proposed framework is to provide a structure that can be applied, interrogated, and refined to find solutions to support doctoral students in a CODeL (Centre for Open and Distance Learning) university. The aim is to offer a starting point for practice, further engagement, and refinement to advance supervision practices in distance education contexts. The proposed cohort supervision framework details activities that may encourage doctoral students to remain motivated toward completing their research outputs. Although the framework was developed for a CODeL university, it may also be applicable in other contexts, as it generally provides opportunities for learning, participation, support, and establishing communities of practice that can help increase the number of doctoral students who complete their research.

Applying heurism to find a solution to a problem implies that the results should be tested, critiqued, and refined for better application. More research is required to evaluate and validate the framework and measure its effectiveness. This requires time and resources to examine the proposed cohort supervision framework for its usefulness in providing extensive supervision assistance to doctoral students, not only at a CODeL university, but also at universities in general. The article provides a practical proposal on how cohort supervision can be applied, specifically in the South African context within a CODeL university. However, the proposed practices can also be considered by other universities, aligning cohort supervision with their unique contexts.

Further exploration is needed on the use of technology to advance functionality, critical thinking, and emancipation. The focus of the article was not to compare various technologies that can be used to facilitate collaboration and engagement for their values and pitfalls. Given that the proposed cohort supervision framework is founded on the use of technology, an extended examination of this topic is required. Similarly, the development of communities of practice to stimulate cognitive, teaching, and social presence requires more research. The value of communities of practice toward enculturation cannot be underestimated. Therefore, more research is needed on how to create supportive communities of practice as part of the cohort supervision framework.

To conclude: To support underprepared doctoral students, supervisors must explore alternative supervision approaches. The different needs of students, who demand engagement and attention and are used to collaborating via social networks, require supervisors to reconsider the ways in which they supervise. Embarking on an alternative supervision approach such as cohort supervision demands that supervisors create meaningful interaction with doctoral students through collective engagement and support. Within the context of the research, the recommendation is that a four-stage cohort supervision framework be considered as an alternative approach to advance doctoral supervision success.

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References

Agné, H., & Mörkenstam, U. (2018). Should first-year doctoral students be supervised collectively or individually? Effects on thesis completion and time to completion. *Higher Education Research & Development*, *37*(4), 669-682. https://doi.org/10.1080/07294360.2018.1453785

Akala, B. U., & Akala, B. M. (2023). How can doctoral supervision be improved? Views from doctoral students in two faculties of education at South African universities. *South African Journal of Higher Education, 37*(6), 217-238. https://doi.org/10.20853/37-6-5290

Bastalich, W. (2017). Content and context in knowledge production: A critical review of doctoral supervision literature. *Studies in Higher Education*, *42*(7), 1145–1157. https://doi.org/10.1080/03075079.2015.1079702

Burnett, P. C. (1999). The supervision of doctoral dissertations using a collaborative cohort model. *Counselor Education and Supervision*, *39*(1), 46-52.

Choy, S., Delahaye, B. L., & Saggers, B. (2015). Developing learning cohorts for postgraduate research degrees. *Australian Educational Researcher* 42, 19-34.

Cornér, S., Löfström, E., & Pyhältö, K. (2017). The relationships between doctoral students' perceptions of supervision and burnout. *International Journal of Doctoral Studies*, *12*, 91–106. https://doi.org/10.28945/3754

Council on Higher Education. (2016). *South African higher education reviewed. Two decades of democracy.* Retrieved March 20, 2024, from http://www.che.ac.za/media_and_publications/monitoring-and-evaluation/south-african-higher-education-reviewed-two-decad-0

Crous, I. (2024). *A journey towards inclusive 4IR in CODeL*. University of South Africa. Retrieved July 04, 2024, from https://www.unisa.ac.za/sites/corporate/default/Colleges/Economic-and-Management-Sciences/News-&-events/Articles/A-journey-towards-inclusive-4IR-in-CODeL

De Lange, N., Pillay, G., & Chikoko, V. (2011). Doctoral learning: A case for a cohort framework of supervision and support. *South African Journal of Education*, *31*(1). Retrieved October 20, 2021, from http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S0256-01002011000100002

Deacon, A. (2018). *Designing a framework for making use of MOOCs*. Retrieved October 20, 2021, from https://idl-bnc-idrc.dspacedirect.org/bitstream/handle/10625/57959/58064.pdf

Department of Higher Education and Training (DHET). (2023). *Statistics on post-school education and training in South Africa: 2021*. Retrieved November 19, 2024, from

https://www.dhet.gov.za/Research%20Coordination%20Monitoring%20and%20Evaluation/Statistics%20on%20Post-School%20Education%20and%20Training%20in%20South%20Africa%2c%202021%20%281%29.pdf

Dysthe, O., Samara, A., & Westrheim, K. (2007). Multivoiced supervision of Master's students: A case study of alternative supervision practices in higher education. *Studies in Higher Education*, *31*(2), 299-318. https://doi.org/10.1080/03075070600680562

Fourie-Malherbe, M., Aitchison, C., Bitzer, E. & Albertyn, R. (2016). (Re)Considering postgraduate education and supervision in the knowledge society. In Fourie-Malherbe, M., Aitchison, C, Bitzer, E, Albertyn, R. (Eds), *Postgraduate supervision: Future foci for the knowledge society* (pp. 1-14). SUN Media.

Fynn, A., & Janse van Vuuren, H. (2017). Investigating the role of non-academic support systems of students completing a Master's Degree in Open, Distance and e-Learning. *Perspectives in Education*, *35*(1), 186-199. https://doi.org/10.38140/pie.v35i1.3459

Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *The Internet and Higher Education*, *2*(2-3), 87-105. https://doi.org/10.1016/S1096-7516(00)00016-6

Glover, S. (2010). Cohort-based supervision for postgraduate creative writers: The effectiveness of the university-based writers' workshop. *The International Journal for the Practice and Theory of Creative Writing*, *7*(2), 123-136. https://doi.org/10.1080/14790726.2010.482670

Govender, K., & Dhunpath, R. (2011). Student experiences of the PhD cohort framework: Working within or outside communities of practice? *Perspectives in Education*, *29*(3), 88-99. https://doi.org/10.38140/pie.v29i3.1698

Gumbo, M. T. (2019). Online or offline supervision? Postgraduate supervisors state their position at University of South Africa. *South African Journal of Higher Education*, *33*(1), 92-110. https://doi.org/10.20853/33-1-2673

Harrison, S., & Grant, C. (2015). Exploring new models of research pedagogy: Time to let go of master-apprentice style supervision. *Teaching in Higher Education*, *20*(5), 556-566. https://doi.org/10.1080/13562517.2015.1036732

Heeralal, P. J. H. (2015). Improving postgraduate supervision in an open and distance learning environment: A case study at the College of Education, University of South Africa. *South African Journal of Higher Education*, *29*(3), 87-100. https://doi.org/10.20853/29-3-490

Lee, A. (2008). How are doctoral students supervised? Concepts of doctoral research supervision. *Studies in Higher Education*, *33*(3), 267-281. https://doi.org/10.1080/03075070802049202

Lee, A. (2010). *New approaches to doctoral supervision: implications for educational development.* Retrieved October 20, 2021, from https://pdfs.semanticscholar.org/a94b/edf7530f6f26767943809e7691266d640beb.pdf

Lee, A. (2018). How can we develop supervisors for the modern doctorate? *Studies in Higher Education*, *43*(5), 878-890. https://doi.org/10.1080/03075079.2018.1438116

Loureiro, M., Huet. I., Baptista, A., & Casanova, D. (2010). Using ICT to enhance online research supervision process. *Acta Academica Supplementum*, *1*, 151-174. https://doi.org/10.38140/aa.v0i1.1281

Maguire, M., & Delahunt, B. (2017). Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. *All Ireland Journal of Teaching and Learning in Higher Education*, *3*, 3351-3354. https://doi.org/10.62707/aishej.v9i3.335

Mahlomaholo, S. (2013). On bricolage and the creation of sustainable postgraduate learning environments. *The Journal of Transdisciplinary Research in Southern Africa*, *9*(3), 379-392.

Manyike, T. V. (2017). Postgraduate supervision at an open distance e-learning institution in South Africa. *South African Journal of Education*, *37*(2), 1-11. http://dx.doi.org/10.15700/saje.v37n2a1354

Maor, D., & Currie, J. K. (2017). The use of technology in postgraduate supervision pedagogy in two Australian universities. *International Journal of Educational Technology in Higher Education*, *14*(1), 1-15. https://doi.org/10.1186/s41239-017-0046-1

Maritz, J. (2013). A journey through currere: Challenging hegemonies in research education and postgraduate supervision in tertiary open and distance learning. *Progressio*, *35*(2), 157-176.

Mbatha, B., & Naidoo, L. (2010). Bridging the transactional gap in open distance learning (ODL): The case of the University of South Africa (Unisa). *Inkanyiso: Journal of Humanities and Social Sciences*, *2*(1), 64-69. https://doi.org/10.4314/ijhss.v2i1.62125

McCallin, A. & Nayar, S. (2012). Postgraduate research supervision: A critical review of current practice. *Teaching in Higher Education, 17*(1), 63-74. https://doi.org/10.1080/13562517.2011.590979

McChesney, K., Burford, J., Frick, L., & Khoo, T. (2024). *Doing doctoral research at a distance: Flourishing in off-campus, hybrid, and remote pathways*. Routledge.

McKenna, S. (2017). Crossing conceptual threshold in doctoral communities. *Innovations in Education and Teaching International*, *54*(5), 458-466. https://doi.org/10.1080/14703297.2016.1155471

Mouton, J., Basson, I., Blanckenberg, J., Boshoff, N., Prozesky, H., Redelinghuys, H., Treptow, R., van Lill, M., & Van Niekerk, M. (2019). *The state of South African research enterprise.* DST-NRF Centre of Excellence in Scientometrics and Science, Technology and Innovation Policy.

Ngulube, P. (2018). *Handbook of research on heritage management and preservation.* IGI Global.

Picard, M. Y., Wilkinson, K., & Wirthensohn, M. (2011). An online learning space facilitating supervision pedagogies in science. *South African Journal of Higher Education*, *24*(5), 954-971.

Ravitch, S. M., & Riggan, M. (2017). *Reason & rigor: How conceptual frameworks guide research* (2nd ed.). Sage Publications.

Robertson, M. J. (2019). *Power and doctoral supervision teams: Developing team-building skills in collaborative doctoral research*. Routledge.

Rouse, R. (2023). Understanding complexity in doctoral lifeworlds and impacts of advising ancestries. *Journal of Praxis in Higher Education*, *5*(2), 53-90. https://doi.org/10.47989/kpdc308

Samara, A. (2006). Group supervision in graduate education: A process of supervision skill development and text improvement. *Higher Education Research & Development*, *25*(2), 115-129. https://doi.org/10.1080/07294360600610362

Samuel, M. & Mariaye, H. (2016). *Continuity, complexity, and change: Teacher education in Mauritius.* Common Ground Publishing.

Samuel, M., & Vithal, R. (2011). Emergent frameworks of research teaching and learning in a cohort-based doctoral programme. *Perspectives in Education*, *29*(3), 76-87. https://doi.org/10.38140/pie.v29i3.1697

Santicola, L., & Morris, R. (2013). Pressing on: Persistence through a doctoral cohort programme in education. *Contemporary Issues in Education Research*, *6*(2): 253-264.

Schulze, S. (2011). A survey of students' views of supervision at Unisa. *South African Journal of Higher Education*, *25*(4), 784-802.

Sodi, T., Bobape, D., & Makgahlela, M. (2021). Botho as an essential ingredient of African psychology: An insider perspective. *South African Journal of Psychology, 51*(3), 1-12. https://doi.org/10.1177/008124632098525

South African Government. (2019). *National Development Plan 2030*. Retrieved July 20, 2024, from https://www.gov.za/issues/national-development-plan-2030

South African Government. (2024). *Higher Education Act 101 of 1997.* Retrieved July 20, 2024, from https://www.gov.za/documents/higher-education-act

Swarts, A. (2017). Nurturing and inspiring across supervisory styles and practices. In McKenna, S., Clarene-Fincham, J., Boughey, C., Wels, H. and van den Heuvel. H (Eds.), *Strengthening postgraduate supervision* (pp. 229-239). SUN Press.

United Nations. (2019). Sustainable Development Goals. Retrieved July 20, 2024, from https://sustainabledevelopment.un.org/?menu=1300

University of South Africa. (2023). *Catalytic niche areas*. Retrieved July 20, 2024, from https://www.unisa.ac.za/sites/corporate/default/Research-&-Innovation/Reports/2021/Catalytic-niche-areas

University of South Africa. (2024). *College of Graduate Studies*. Retrieved July 20, 2024, from https://www.unisa.ac.za/sites/corporate/default/Colleges/College-of-Graduate-Studies

University of South Africa. (2024). *Student enrolments*. Retrieved July 20, 2024, from https://www.unisa.ac.za/sites/corporate/default/About/Facts-&-figures/Student-enrolments?lang=01

Van Biljon, J. A., & De Kock, E. (2011). Multiplicity in supervision relationships: A factor in improving throughput success? *South African Journal of Higher Education*, *25*(5), 987-1002. https://doi.org/10.20853/25-5-5561

Van Biljon, J. A., & De Villiers, M. R. (2013). Multiplicity in supervision models: The supervisor's perspective. *South African Journal of Higher Education*, *27*(6), 1443-1463.

Van Biljon, J. A., Van Dyk, T., & Naidoo, L. (2014). Towards increasing supervision capacity: The pyramid cohort supervision framework. *SACLA*, *14*, 166-173.

Van der Merwe. P. (2022). *CODeL+ viewed through the research lens*. Retrieved July 01, 2024, from https://www.unisa.ac.za/sites/corporate/default/News-&-Media/Articles/CODeL%2B-viewed-through-the-research-lens

Van Rooy, M. P., & Madiope, M. (2012). Enhancing assessment in ODL: The Unisa online experience. *Progressio*, *34*(1), 156-169.

Wichmann-Hansen, G., Thomsen, R., & Nordentoft, H. M. (2015). Challenges in collective academic supervision: Supervisors' experiences from a master programme in guidance and counselling. *Higher Education*, *70*, 19-33. https://doi.org/10.1007/s10734-014-9821-

Winberg, C., & Winberg, S. (2018). 'More than writing a thesis'. Reflections on cohort research supervision. In Bitzer, E., Frick, L., Fourie-Malherbe, M & Pyhältö, K. (Eds.), *Spaces, journeys and new horizons for postgraduate supervision* (pp. 93-108). SUN Press.

Wisker, G., Robinson, G., & Shacham, M. (2007). Postgraduate research success: communities of practice involving cohorts, guardian supervisors and online communities. *Innovations in Education and Teaching International*, *44*(3), 301-320. https://doi.org/10.1080/14703290701486720

Wisker, G., McGinn, M. K. Bengsten, S. S. E., Lokhina, I., He, F., & Cornér, S. (2021). Remote doctoral supervision experiences: Challenges and affordances. *Innovations in Education and Teaching International*, *58*(6), 612-623. https://doi.org/10.1080/14703297.2021.1991427

Youtie, J. & Shapira, P. (2008). Building an innovation hub: A case study of the transformation of university roles in regional technological and economic development. *Research Policy*, *37*(8), 1188-1204. https://doi.org/10.1016/j.respol.2008.04.012