Doctoral Graduate Attribute Development: Lessons From the South African Context

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Abstract

Doctoral graduate attributes (DGAs) are the qualities and characteristics of a doctoral graduate. They are considered in the context of concerns for the quality and outcomes of doctoral education. Graduate attributes develop through formal education and the hidden curriculum, influenced by various agents such as the supervisor, peers and the institution of study. In doctoral education, where there is rarely a structured curriculum, consideration of how DGAs develop warrants investigation to ensure threshold levels of DGA development can be supported. Semi-structured interviews were conducted with doctoral supervisors, graduates and students from four South African higher education institutions. This article describes barriers and facilitators impacting the development of DGAs. The findings provide evidence of the interplay between various aspects that facilitate DGA development, including the doctoral student, supervisor(s), peers and institutions. The lack of awareness of DGAs and support available are important barriers to DGA development. It is recommended that support be offered at all levels, to facilitate learning. Agency should be encouraged to support the pursuit of doctoral scholars' novel contribution, and growth as creative problem solvers. The research contributes by constructing a framework of support for DGA development.

Key Words: doctoral education, doctoral graduate attributes, hidden curriculum, higher education, postgraduate education and training, researcher development, research supervision, South Africa university.

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Résumé:
Les attributs du diplômé de doctorat (DGA), les qualités et les caractéristiques d'un diplômé de doctorat sont examinés à l'aune des préoccupations relatives à la qualité et aux résultats de la formation doctorale. Les attributs du diplômé se développent au cours de la formation formelle et à travers le curriculum caché, sous l'influence de divers agents, notamment le superviseur, les pairs et le contexte institutionnel. Dans le cadre de la formation doctorale, où il existe rarement un programme structuré, il convient d'étudier la manière dont les DGA se développent afin de s'assurer que les niveaux-seuils de développement des DGA peuvent être soutenus. Des entretiens semi-structurés ont été menés avec des directeurs de thèse, des diplômés et des étudiants de quatre établissements d'enseignement supérieur sud-africains. Cet article décrit les obstacles au développement des DGA ainsi que les elements qui facilitent un tel développement.. Les résultats fournissent des preuves de l'interaction entre les différents acteurs qui facilitent le développement de la DGA; il s'agit notamment du doctorant, de(s) directeur(s) de thèse, des pairs et des établissements. La méconnaissance du soutien et des AGD constitue un obstacle important au développement des AGD. Une variété d'offres de soutien à tous les niveaux permet de renforcer l'apprentissage et d'encourager l'action dans la recherche d'une nouvelle contribution et d'un développement en tant que solution créative aux problèmes. La recherche contribue à l'élaboration d'un cadre de soutien au développement de la DGA.

Mots clés:
formation doctorale, attributs du doctorat, curriculum caché, enseignement supérieur, éducation et formation postuniversitaires, développement des chercheurs, supervision de la recherche, Afrique du Sud.

Introduction

In recent years, there has been increased enrolment in doctoral degrees, and subsequent concerns about massification at the expense of quality, and concerns regarding employability and relevance of the apex degree beyond academia (McKenna & van Schalkwyk, 2023; Spronken-Smith et al., 2023). Against this backdrop, doctoral graduate attributes (DGAs) have received greater attention (Spronken-Smith et al., 2023). Doctoral education is a strategic priority in the higher education (HE) context internationally, as it plays a pivotal role in advanced skills development and capacitates the system of innovation for meeting development goals (Cardoso et al., 2022). Common issues relating to doctoral education include high attrition rates, extended time for completion, insufficient funding, and the scope and relevance of skills developed (Cardoso et al., 2022; McKenna & van Schalkwyk, 2023). The perception that doctoral graduates lack relevant skills is partially due to a lack of awareness of DGAs, rather than the lack of development (Senekal et al., 2022). The Doctoral Degrees National Report (hereafter, the Doctoral Review) (CHE, 2022), reviewing doctoral education in South Africa (SA) found many institutions did not meet the threshold requirements of the Qualifications Standards for Doctoral Degrees (hereafter, the Doctoral Standards) (CHE, 2018) or had inconsistencies between faculties and departments. The lack of awareness of DGAs was flagged as particularly concerning (Faller et al., 2023), as this impacts how DGAs are supported and developed. The present article describes barriers and facilitators to DGA development, and presents a framework of support for DGA development.

Literature

DGAs and the Hidden Curriculum

DGAs are the qualities and characteristics of a doctoral graduate (Yazdani & Shokooh, 2018). A recent systematic review of DGAs by Senekal et al. (2022, p.1) proposed "knowledge, research skills, communication skills, organisational skills, interpersonal skills, reputation, scholarship, higher order thinking skills, personal resourcefulness, and active citizenship" as relevant DGAs. Graduate attributes are most commonly implemented in undergraduate degree programmes, where attributes are embedded in the curriculum (Spronken-Smith et al., 2023). At a doctoral level, the degree typically entails independent research under supervision accounting for most, if not all, of the degree credits (CHE, 2018); so, there is no formal curriculum into which the DGAs may be embedded. The Doctoral Review highlighted that graduate attributes "are not explicitly formulated during postgraduate studies but... their attainment is embedded in the nature of doctoral studies" (CHE, 2022, p. 2022), with some attributes evidenced in the thesis itself, and others considered to be subjective. The 'hidden curriculum' encompasses the range of informal, unofficial and unintentional learning taking place within and beyond formal HE spaces, and should be considered of equal import as formal curriculum spaces (Elliot et al., 2020). Therefore, the hidden curriculum must be considered as pedagogical space for DGA development.

Agent Supporting Doctoral Education

The Doctoral Review flags the influence of the national context, institutional contexts, field/discipline, and the supervisor, in impacting DGA conceptualisation and differentiation (CHE, 2022). The Doctoral Standards present general threshold DGAs, but implementation requires

a differentiated or hierarchical approach, prioritising certain attributes, based on institution, field and discipline (Faller et al., 2023). The lack of understanding of DGAs is a barrier for its implementation and support for doctoral development (Senekal et al., 2024). The development of DGAs, such as ownership and agency, are supported by various 'hidden curriculum agents', including among others, supervisors, fellow students, and colleagues (Elliot et al., 2020). If utilised, these agents "support, empower and enable doctoral researchers in creating learning pathways that are strategically intended to harness a tailored hidden curriculum based on personal needs and professional aspirations" (Elliot et al., 2020, p. 131). Similarly, researcher development at a postgraduate level has been conceptualised to occur at various levels, including the individuals' personal characteristics, supervisors support and institutional context (Albertyn et al., 2018). Each of these actors has potential to support or hinder the development of DGAs during the doctoral journey.

The provision of support for researcher development at an institutional level is aligned with strategic initiatives to support postgraduate retention and throughput (Frantz et al., 2021). Supplementary or co-curricular workshops and courses offered on various topics support admission-level skills gap reduction (Mantai & Marrone, 2022). Although a range of courses supporting academic and personal attributes are available, most doctoral graduates attended workshops on academic and research topics (Spronken-Smith et al., 2023). Doctoral graduates stressed the need for additional support for developing personal and interpersonal skills, such as teamwork and communication (Spronken-Smith et al., 2023). Institutions provide support through departmental or faculty activities, and student support services (Frantz et al., 2021). The HEI is the broader context in which doctoral education takes place, yet the supervisor is the students' primary point of contact at the HEI.

Research on doctoral supervision highlights concerns about quality of supervision, increased enrolment, reliance on novice supervisors, and insufficient training and support for supervisors (Cardoso et al., 2022). The supervisory relationship has a significant impact on completion time, positive student experiences and overall capacity development in doctoral programmes (Flotman, 2021; Senekal, 2014). Supervisors are noted as 'hidden curriculum agents' (Elliot et al., 2020), supporting doctoral researchers' development, and socialising them into the academic community (Frick, 2023). Wisker (2023, p. 89) frames the supervisors' role as one of "opening of doors, demystification, modelling, sharing and networking enabled by interactive dialogues, dynamic interactions and practical action." Developmentally, supervisors support students by

containing and normalising uncertainty in thesis work (Albertyn & Bennett, 2020). Uncertainty is experienced at various levels, including the research process and personal self-doubt or imposter syndrome, which can result in the student avoiding their research, trying to reduce their uncertainty, or harnessing it for their development (Albertyn & Bennett, 2020). Supervision typically takes place through developmental dialogue and feedback (Wisker, 2023). The supervisor's role in supporting independence is through interdependence (Elliot et al., 2023). 'Interdependence' is argued to be more apt than 'independence' as a DGA, since research is rarely conducted in isolation (Frick, 2023). Recent shifts in doctoral education internationally suggest a movement away from the traditional master-apprentice model, towards more structured and collaborative supervision models (McKenna & van Schalkwyk, 2023). Collaborative supervision spaces help overcome the challenges of potentially limited time, expertise or support from a single supervisor (Cardoso et al., 2022). Collaborative supervision has the benefit of multiple supervisors, often with different areas of expertise, and diversified teams that include postdocs and other postgraduate researchers (McKenna & van Schalkwyk, 2023). While this collaborative approach is not without its challenges, it may be more suited to the Global South, and for North-South collaborations, to support the development of knowledge with local relevance (McKenna & van Schalkwyk, 2023).

Collaborative supervision creates nurturing spaces for doctoral students through peer networking, reducing the loneliness often experienced in the doctoral journey (McKenna & van Schalkwyk, 2023). Colleagues and other students are also considered to be hidden curriculum agents (Elliot et al., 2020). The socialisation of doctoral candidates into research communities occurs through the opportunities doctoral candidates engage in during their doctoral studies (Aarnikoivu, 2023). Exposure either leads to familiarity and engagement in the academic community, or alienation and avoidance of the community (Aarnikoivu, 2023). Engagement in peer mentoring can support a range of attributes, including "leadership skills, teamwork and interpersonal skills" (Frantz et al., 2021, p. 11). Engaging in peer support can "powerfully transform the often isolated and challenging journey into a reflexive and developmental one" (Dangeni et al., 2023, p. 49), and creates a sense of connection and socio-emotional support (Frantz et al., 2021). The nature of the socialisation and support from peers during the doctorate is an important consideration in the doctoral journey.

Doctoral Intelligence Framework

The Doctoral Intelligence Framework proposed by Albertyn (2023) includes four domains: "Knowing (developing expertise), Doing (benefits of practice),

Thinking (high-order mental processing) and Willing (open-mindedness for continuing development)" (p. 4). 'Knowing' includes discipline-specific knowledge and depth of expertise typified by the doctorate, and hidden curriculum components related to a mindset for lifelong learning and the personal and societal value associated with the doctoral degree. 'Doing' relates to the practical components of the research product, and the subsequent "learning by doing" (p. 160), resulting in confidence, ownership and agency. 'Thinking' includes the various problem-solving and creative thinking tools that doctoral scholars utilise, and supported researcher identity development, including confidence and independence. 'Willing' is reflected in the iterative nature of postgraduate research, and underpins the learning process, giving the scholars the motivation and drive to persevere, with the bigger picture of the purpose of their degree in mind (Albertyn, 2023). Albertyn (2024) argues that developing mindsets is nonlinear, occurring iteratively throughout the doctorate, and that the framework may be applied to reflect on doctoral education at any stage. This framework will be used as a lens to interpret the findings of this study.

The Current Study

Given the range of DGAs evidenced in the literature, the varied contexts in which DGAs develop, and the implicit nature of many attributes requiring increased support, there is a need to explore barriers and facilitators to DGA development. DGAs are not just outcomes of the doctorate, but are required at admission and are crucial for the successful completion of the doctorate (Mantai & Marrone, 2022; Senekal et al., 2024). For example, students need a basic level of research skills to conceptualise and initiate their study. Their research skills continue to develop while conducting their research, facilitating progression in the study. An understanding of facilitators and barriers to the development of DGAs will inform improvements to system(s) to ensure doctoral graduates are appropriately supported in developing the attributes they are expected to graduate with. This article describes barriers and facilitators that doctoral supervisors, graduates and students experienced, impacting the development of DGAs. The findings provide evidence of the interplay between various aspects that facilitate DGA development, including the doctoral student, supervisor(s), peers and institutions.

Study Context

There has been a marked increase in doctoral enrolment at many African universities, including in SA, aligned with local and international policy agendas (Cardoso et al., 2022). Increased enrolments triggers concerns of institutional capacity and quality (Faller et al., 2023). SA holds a strategic

role in doctoral education in Africa, being home to the top ranked HEIs in Africa, and drawing many international students, particularly from the Southern African Development Community (Noel et al., 2022). It is a pertinent study location for examining issues of doctoral education.

Methods

A qualitative, descriptive study was conducted to elicit participants' experiences of DGAs. Participants included doctoral students (n=4), graduates (n=3), supervisors (n=6) and an academic specialising in HE quality assurance (n=1). Two of the doctoral students and one of the doctoral graduates were also employed at a higher education institution in South Africa. Participants were purposefully selected to ensure maximum variation of perceptions and equal representation of students and graduates to academic staff. Interviews continued until saturation was reached, and no new information emerged. Participants were from four SA HEIs: University of the Western Cape (n=6), Stellenbosch University (n=3), University of KwaZulu-Natal (n=3), and Central University of Technology (n=2), from various disciplinary backgrounds (including humanities, social and natural sciences), and with an equal split in terms of gender.

The criteria for selection were:

1. Doctoral students who were enrolled at a SA HEI for at least two years and had completed at least part of their data collection (n=4);
2. Doctoral alumni who had graduated within the last six years from SA HEIs (n=3); and
3. Academics who were from SA HEIs and who had more than five years of supervision experience at a doctoral level (n=6), or were involved in HE quality assurance at their institution (n=1).

Participants were invited to participate via email, after which an agreed upon time was identified for the interview. The first author conducted semi-structured interviews with each participant, via Zoom, between January and April 2022. Interviews were approximately 60-90 minutes in length, audio recorded and transcribed verbatim. Transcripts were analysed following Braun and Clarke's (2012) steps of familiarisation, coding and theme development using Atlas.ti (version 9). An inductive approach was used for coding barriers and facilitators to DGA development.

The study obtained ethics clearance from the Humanities and Social Sciences Research Ethics Committee (HS21/7/19) at the University of the Western Cape. Standard ethics principles were adhered to, as permission to access participants was obtained from the universities, and informed

consent from each participant. Participants' personal information was anonymised in the transcripts to uphold confidentiality and anonymity. Doctoral students were coded as "DS", doctoral graduates as "DG" and academic staff (including the quality assurance academic) as "AS", each with a corresponding number as a unique identifier.

Finding and Discussion

Participants discussed four broad areas of support, including institutional support, supervision support, peer support and intrapersonal support, each of which contained aspects that facilitated or hindered the development of DGAs. The findings demonstrate that there are many sources of support available to doctoral students for the development of their DGAs. The importance of various sources and options for support reflects the benefit of 'multiple ways of doing' in accessing the hidden curriculum and supporting doctoral development (Preece, 2023). Multiple support systems allow doctoral students to use their agency to select what is most suitable for their needs and learning style, taking ownership of their learning and supporting their autonomy as independent researchers.

Institutional Support

Participants reflected on various forms of institutional support available at their respective institutions. Formalised support was noted to be largely determined by the curriculum design of the doctoral programmes, as the design of the programme and thesis itself determine the product of the thesis and the "process that the student undertakes, in order to, ultimately, develop the[ir] attributes" (AS7). Supplementary training or development offered by institutions includes "academic writing workshops, ...writing retreats, ... [and] coaches" (DS1), and "seminars for... students on the thesis writing process" (AS1). Participants note that training supports the development of academic and professional skills, and includes proposal writing, literature reviews, research methods, data analysis, writing for publication, time management skills; and pre-doc programmes, inductions and writing retreats. Such support is provided by the department, faculty, designated postgraduate support offices and/or the library. Supplementary training bridges students' skills gaps, and complements the supervision process. As a supervisor notes, "Some of them haven't even got the basic skills... So instead of sitting each one down individually, I would send them off to these courses" (AS5). For staff who are enrolled for their doctorates, there is also support in the form of teaching relief, allowing them to "just [focus] on the PhD during that time and that helped a lot" (DS2).

There are various systems at institutions providing facilitative spaces to support doctoral students and the development of their DGAs.

While there is a range of support available from institutions, the lack of awareness of these programmes – on the part of students and supervisors – is a barrier to the utilisation thereof. One student noted: "I know [about] it, because I work at the institution, but nobody actually tells you" (DS2). Supervisors and faculty representatives need to be proactive in connecting students to the resources available, to facilitate awareness and access. One student who is also a staff member noted, "I went to go look for those resources for myself, and then for my students... [I have] put together a list from my own experience" (DS2). However, supervisors can be a barrier to making use of supplementary training, as a student reported that their supervisor "wouldn't approve things or they would say no, you should focus on this and that right now" (DS4). In some instances, there are statistical consultants at institutions; however, some supervisors are reluctant to allow students to use these services, due to the perception that students should work independently to develop and demonstrate their data analysis skills. Furthermore, students may not have the time to attend multiple training courses, due to their multiple responsibilities (studying, working, family). Supervisors play a key role in providing access by making students aware of and approving access to available institutional support.

The findings indicate that the institutional support available is supplementary, non-credit bearing and not compulsory, as doctoral education in SA typically excludes a formal coursework component (CHE, 2022). Supplementary training allows students to increase their skill set as needed, since not all students enter the doctoral programme with equal levels of skills; hence, the lack of skills may be a challenge for progression in their doctoral research. Increased expectations of entry-level attributes for doctoral studies (Mantai & Marrone, 2022), coupled with under-prepared candidates (Faller et al., 2023), make supplementary training an essential component of institutional support. McKenna and van Schalkwyk (2023) highlight an international shift towards more structured and collaborative curricular approaches to doctoral education, with the inclusion of coursework in the first two years of study. This is worth considering, particularly in contexts with underprepared or disparate levels of preparedness among doctoral candidates. Structured and collaborative approaches could help students in overcome gaps in their skill sets, which would otherwise be a barrier to the further development of their DGAs.

Supplementary support available at institutional level primarily focuses on the development of research and academic skills, and DGAs that are

explicitly aligned to the degree. Spronken-Smith et al. (2023) found that almost three quarters of graduates engaged in workshops or courses targeting research and academic skills. While workshops on non-research/academic attributes such as communication, teamwork, networking and career development were available, participants identified a need for better support for the development of these attributes (Spronken-Smith et al. 2023). Supplementary training may be considered as part of the informal curriculum and as support to the formal learning processes of thesis work; yet it is also part of the hidden curriculum due to the socialisation and peer support in these spaces. Attending training provides opportunities for doctoral students to network, increasing the potential to foster social support from peers in a similar experience, reducing the isolation and loneliness of the doctoral journey (Albertyn et al., 2018). The institutional context's role in DGA development mirrors that identified for postgraduate researcher development by Albertyn et al. (2018), thus confirming the central role of institutions in the provision of a supportive environment.

These findings show that the formal curriculum and support programmes in HEIs are embedded in the knowing and doing domains of the Doctoral Intelligence Framework (Albertyn, 2023). However, it is vital to also focus on developing higher-order thinking in creative and novel, even risk-taking approaches to the doctoral process and product (Albertyn, 2024). These aspects are part of the hidden curriculum, and are critical to DGA development, as higher-order thinking, includes creativity and problem-solving (Senekal et al., 2022). The development of these higher order thinking skills, which are critical for the novel contribution required of the doctorate, is an important aspect that may be supported in the supervisory context.

Supervisory Support

Supervision plays a crucial role in supporting doctoral students and the development of their DGAs, yet variation in supervision approaches impact on the nature of the support. Supervisors reflect on how they approach academic skills development, which primarily takes place in the form of critical feedback and engagement with drafts. One supervisor noted: "I do it through quite a lot of intense work, both in conversation but also in commenting on drafts" (AS4). Some take a more direct approach: "you need to be actually hard with them, and not take nonsense" (AS5). To ensure students take ownership and grapple with their work, one supervisor said: "most of the time I… need them to struggle through it" (AS3). The supervisor argues that grappling supports the student in becoming an independent researcher "which is my understanding of what a PhD graduate should

be" (AS3). Supervisors use different approaches, some being more hands on and others using more reserved approaches, each supportive of the development of the typical, academic attributes, including attributes like ownership and independence.

Some participants stress the importance of learning and teaching as part of supervisory responsibilities. One supervisor noted: "I think we should teach our PhDs more" (AS5), and another highlighted that "supervisors [do] not address the learning and teaching that must take place in a PhD" (AS2). However, one supervisor argues that there is limited time and capacity for teaching, which they believe should take place outside of supervision: "you need to be able to stand on your own feet in terms of skills. I shouldn't now still be teaching you the skills; you should be applying them, and I should just be leading you" (AS5). The lack of teaching and learning in the supervisory space is a barrier to the intentional development of DGAs. Supervisors may lack the resources or skills to provide the required support, and are "under a lot of strain" (AS4) which can be a barrier to providing support directly. Supervisors reflected that their own skills and abilities affected their focus in supervision: "I don't have those skills. So, that could be why I'm not pushing it" (AS1). However, a supervisor's limitation is an opportunity to refer students to supplementary institutional training. Supervisors are themselves the product of the supervision they received. One supervisor said: "I find myself doing that. I've been supervised like that." (AS5). They note a general expectation that the experience of being supervised is sufficient supervision training, and in some cases, there is a lack of formalised supervision training, both during the doctorate and for academic staff. This is not to say that there are no formal supervision training opportunities at the institutions represented, but rather that these are not necessarily known by or available to all of the participants. This impacts the nature and scope of supervision provided, and is a barrier to development of DGAs in the supervisory space. The supervisors' own willingness or capacity to provide training and development within the supervision context impacts the development of DGAs within that space. As noted above, some supervisors actively support the pursuit of interdisciplinary engagement and skills development, while others may, perhaps inadvertently, prevent students from accessing such support.

Supervisors noted that they tailor their supervision approach, based on students' needs and professional aspirations, as "you will implement the strict understanding of the graduate attributes, and then you will add some things that you will regard as important for the transfer between the academic environment and then also business and industry" (AS6). If the student is a staff member as well, there may be more professional

mentoring that takes place, as "you're also preparing the student one day to enter academic life" (AS6). The focus of supervision then shifts to not "just helping them with their research, [but to] modelling the supervision process" (AS3). However, the mentorship dynamic does not always fall into the scope of supervision. A student noted: "I am lucky... [that] there was a huge mentorship component" (DS1). Participants point out that while supervisors may guide, internal motivation is key, as "I can remind them of what motivated them, and I can inspire them, but they need to hold that motivation through the process" (AS3). With a more independent student, "the supervisor's role can be more of a sounding board" (AS4). However, one supervisor argued that the supervisory relationship should primarily be an academic one, expecting students to utilise social support "when things don't work out and when the resilience isn't there" (AS5). Such supervision styles may primarily support the academic DGAs, but neglect the more intrinsic, personal DGAs, which are seen as "indirect outcome[s]" (AS5) of the doctoral process, which is by nature a "major growth experience and a major learning curve" (AS5). The tailoring of supervisory approaches facilitates the nurturing of specific attributes. The lack of such tailoring is a barrier to suitable attribute development, as students receive generic support that is not aligned with their aspirations or academic needs.

The supervision model impacts DGA development as well. Co-supervision has the benefit of availing expertise in various areas for a multidisciplinary project. However, it can be a barrier when there is disagreement, with one supervisor "in the middle" (AS5), or where one supervisor is more involved and the other more distant. As illustrated in the following case, where the primary supervisor "gives broad direction and then he is not involved. And my secondary supervisor gives most of my detailed feedback" (DS4). Cohort supervision has the benefit of students working together on similar projects, and being able to provide input and support to each other, "so what the one has learnt can actually influence the other one in a positive way" (AS3). The supervisory model can facilitate or be a barrier to the development of DGAs, depending on how it is negotiated and executed.

The findings highlight the role of the supervisor as a gatekeeper for access to learning, which aligns with the concept of the supervisor as an agent of the hidden curriculum. Such a supervisor may "support, empower and enable doctoral researchers in creating learning pathways that are strategically intended to harness a tailored hidden curriculum based on personal needs and professional aspirations" (Elliot et al., 2020, p. 131). Supervisors may be more aware of their role in relation to the formal and/or informal curriculum, but less aware of their role in relation to the hidden curriculum. The role of the supervisor in supporting researcher development at the Masters level (Albertyn et al., 2018) continues at a doctoral level, which is in contrast to views that doctoral students should be independent already. However, independence needs to be fostered and developed through interdependence and a collaborative, supportive supervisory relationship (Elliot et al., 2023).

Supervisors' (lack of) awareness of DGAs informs the (lack of) support for a range of DGAs (Faller et al., 2023). Supervisors reflected that they provide input particularly about critical thinking (thinking mindset), and input concerning subject matter expertise (knowing mindset) (Albertyn, 2023). Supervisors engage primarily with the development of more academic attributes in their supervision, referring primarily to the formal curriculum space. How supervisors engage and support students, particularly in grappling with uncertainty, is crucial to the creative process of knowledge creation (Albertyn & Bennett, 2020). Supervisors who contain and normalise uncertainty, as it surfaces, facilitate the learning process and empower students to harness uncertainty for their growth and development (Albertyn & Bennett, 2020). While the supervisor may refer the student to institutional training, this does not abdicate supervisors of their teaching and learning responsibilities. It is the supervisors' responsibility to ensure that "the student acquires all required generic skills in the research supervision process" (Noel et al., 2022, p. 86). Supervisors utilise various approaches, and prioritise different attribute development, but it appears that a tailored approach based on the students' existing skill set, needs and aspirations should guide the focus and to an extent, the nature of the supervision provided. These findings align with the importance of supervisors supporting broader skill development for employability (within and beyond academia), and tailoring approaches based on career aspirations (McKenna & van Schalkwyk, 2023). The tailoring of approaches reflects what Preece (2023) terms, the 'multiple ways of doing' which scaffolds learning through options, supporting agency and ownership in decision making. A tailored approach further aligns with the implications of the Doctoral Review, that not all students develop the same attributes in equal measure (CHE, 2022), but that a differentiated approach, based on field of study or discipline, career goals, and institution of study determines the hierarchy of DGAs developed (Faller et al., 2023).

The findings indicate a gap in terms of supervision training, as the experience of being supervised is implied to be sufficient for doctoral graduates to be able to supervise (CHE, 2022). The need for supervision training has been raised in other research as well (Noel et al., 2022). The supervisors interviewed reflected that their supervision style is influenced by the way they were supervised. Similarly, their personal challenges or lack

of certain attributes, e.g., project management, impacted their (in)ability to actively support the development of that attribute in their supervision practices. Current shifts to collaborative models of supervision (McKenna & van Schalkwyk, 2023) may assist in overcoming these challenges, through having multiple supervisors with different relevant expertise, and improving support for a range of DGAs in the supervisory space. Supervisory skills and practices are typically considered to be part of the hidden curriculum, as they are learned experientially by being supervised. However, the findings show the importance of ensuring that good supervisory practices are emulated, as these are what will be reproduced. Supervisory training, where not already available, should be formalised, targeting doctoral students, early career academics, and/or established academics, to ensure that evidence-based supervision practices are instilled.

Peer Support

Other forms of support include interpersonal support outside of the supervisory relationship. Students reported having an accountability partner, "someone you're bouncing off ideas" (DS1); "we encourage each other, we celebrate each other's achievement" (DS3). Participants note that other students can provide peer support, whether through a buddy system, summer school or group supervision space. Connecting with others in the same process allows them to "draw on other students' strengths and things that they had completed or gone through already" (DS2). Peer support also makes the PhD less lonely, as one student noted: "I'm independent outside of my supervisors, but in terms of the community of other PhD students, I'm not alone" (DS3). From a supervisor's perspective, encouraging peer support is "important for me to build in enough support for the student, which is not just me, to get them through the process" (AS3). The presence of social support from peers results in less need for emotional support during supervision, enhancing a focus on primarily academic support. However, the ability to ask for help can be a barrier to utilising social support, as one student explained, "I've been less willing to reach out" (DS4). Social support outside of the supervisory relationship is important for DGA development, particularly the personal attributes of endurance.

The findings highlight the importance of peer support for facilitating DGA development. The provision of support and guidance throughout the doctorate, is evidence of peers as agents of the hidden curriculum, facilitating access to and engagement in formal and informal learning and support opportunities (Elliot et al., 2020). Participants noted that the social-emotional support of peers helped to alleviate loneliness (Dangeni et al., 2023; Frantz et al., 2021), and supplemented support of supervisors,

allowing the student to function interdependently. Peer support was noted to be facilitated through institutional learning spaces, such as inductions or buddy programmes, and through group supervision models. This provides evidence of the benefits of peer support facilitated in collaborative supervision models that reduces reliance on the supervisor by creating collaborative nurturing and supportive spaces (McKenna & van Schalkwyk, 2023). On a broader level, peer support is an important aspect of researcher development (Albertyn et al., 2018), and a protective factor in the doctoral journey, facilitating the development of DGAs. Institutions must provide spaces that foster peer support connections and communities of practice, whether through institutional support provided in inductions, workshops and retreats, or through encouraging and supporting collaborative supervision models.

Intrapersonal Support

Doctoral students themselves influence the development of their own DGAs. The proclivity to utilise available resources is important for the development of DGAs. As demonstrated above, "if you want to find assistance in doing a PhD... there is assistance out there" (DG1). Personal investment, the internal motivation and drive for their study, helps students persevere in the face of challenges, facilitating the development of DGAs through difficulties. According to one student, "the PhD process has taught me that you have to be intentional in progressing" (DS3) and that "you need to have radical motivation to do this thing the best way you can. You need to be very invested in it" (DS4). Participants say that self-awareness of one's strengths and areas of growth facilitates identifying where support is needed. Students taking initiative in seeking relevant training opportunities or engaging in self-study to overcome skills gaps supports the development of required attributes. Self-directed learning, for example, watching YouTube tutorials or reading textbooks, overcame limited access to other support. One student noted: "I've been forced to read up and self-educate on more advanced kinds of regression that I wouldn't know how to do, previously" (DS4). Personal investment and taking initiative are facilitators for making use of opportunities available that support DGA development.

Students' existing skills facilitate the further development of DGAs. A student highlighted that their existing literature review skills helped them "find my feet" (DS3) in their interdisciplinary study. Students who have published from their Masters research were thought to experience less imposter syndrome, as "they do have more confidence" (DS1). Supervisors explained that they look for a baseline of academic writing skills, "the potential for thinking innovatively and creatively... [and] competence in

research, although, I think that can be overcome" (AS1). Conversely, gaps in the existing skill set can be seen as a barrier to DGA development. "We find that very few students in our field are prepared for the kind of research that they need to do" (AS5). Lack of methodological preparedness is an area that "students are anxious about" (DS1). A student saw their lack of methodological skills as "one of the main impediments to getting your doctorate... I've wanted to do more than my methodological proficiency allows me" (DS4). While the gap in skills is a barrier, it can be reframed as an opportunity to provide targeted support: "we need to be able to see what can be done, in order to support those students" (AS7). A student's skill set can facilitate or hinder further DGA development.

Students and graduates highlighted the gradual and implicit nature of DGA development. By virtue of the duration of the doctorate, DGA development happens "over time" (DG3), and growth is inevitable, as "you learn quite a lot along that way, and that definitely influenced how I do my work today" (DG2). Participants described development as more implicit, not something that was overtly discussed, but in many cases was "as a direct result of their involvement in a PhD programme" (DG3). DGA development is an ongoing process and "I think those skills continue to develop as I go through the various phases into the PhD... as a PhD advances, one's skills advances too." (DS3). Time is therefore a facilitator for DGA development, allowing students to develop appropriate attributes throughout their doctorate. Imposter syndrome, perfectionism and a lack of self-belief are barriers to DGA development, as students doubt their abilities and can make engaging with support and feedback more difficult. When faced with challenges, or when students "get stuck and they go AWOL [absent without leave], however much you might try and reach out and support" (AS4), it makes it difficult for supervisors to provide the needed support. Imposter syndrome "makes us lose sight of the attributes that we know we have... And I think that's what holds [us] back" (DS1). While part of the learning process, imposter syndrome needs to be overcome to develop DGAs, or conversely, as their attributes develop, their sense of self and self-belief improve. Students may be aware of their limitations; however, they need to take initiative and ownership of their doctorate journey to make use of the support available, so that they can continue through the journey, developing their attributes over time, through overt and implicit means.

The findings highlight that doctoral researchers are agents in their own DGA development. They need to take initiative, to seek out and utilise the various forms of support available, and to identify what works for their learning style and their training needs. However, doctoral candidates do not begin on equal footing, and there is a noted challenge of under-

preparedness amongst doctoral students (Faller et al., 2023). Doctoral researchers' ownership and initiative in making use of opportunities is key to pursuing and accessing the hidden curriculum (Elliot et al., 2023). Albertyn et al. (2018) similarly found that personal characteristics in students' development (including ownership and agency) were crucial for researcher development.

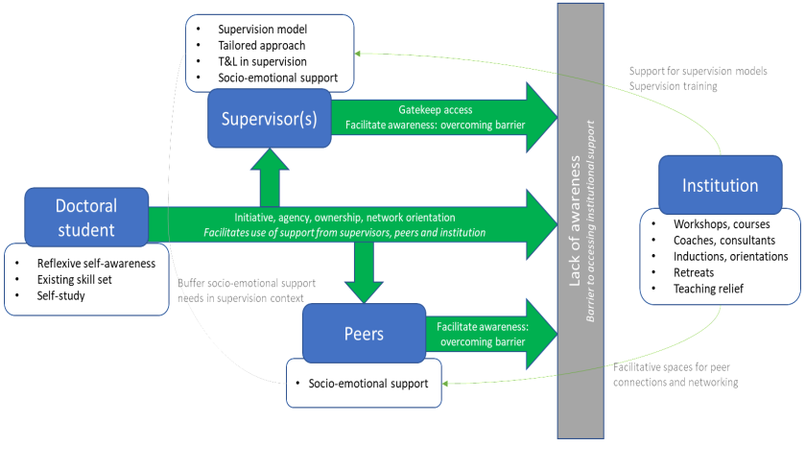
The importance of taking ownership and initiative in doctoral research, is indicative of internal motivation as the driver (willing mindset) (Albertyn, 2023). It is often left to the student to identify what skills they need and take initiative to source relevant training (Mantai & Marrone, 2022). If students are unaware of what skill sets they should be developing during the doctorate, they may struggle to take such initiative (Faller et al., 2023). The inability or reluctance to reach out can also inhibit access to available support networks. Participants note that imposter syndrome and lack of self-belief can further impact the process, as doctoral students withdraw rather than reach out. Therefore, the findings suggest that network orientation is an important determinant of DGA development. Network orientation is the proclivity to make use of the various support networks available (Hagler et al., 2024). Network orientation impacts the perception of thesis writing as stressful, and the working alliance with supervisors, in terms of how readily the student reaches out and utilises support from supervisors (Senekal, 2014). Network orientation is important for distinguishing why certain students make use of support and others do not.

Framework of Support for DGA Development

The interplay of the above support structures suggests a framework for DGA development (Figure 1). The central aspect is doctoral students. Their awareness of their own skill set and areas of growth, together with their ownership, agency and network orientation impact on their likelihood of reaching out for and utilising available support structures for the development of their DGAs. Awareness of DGAs and their progress towards these facilitates intentional engagement and pursuit of their development. The second aspect is the supervisor. Supervisors provide central support for the development of academic attributes in the supervisory space, yet gatekeep access to institutional support. Their responsibility is to support the development of all DGAs, tailoring the approach, based on the individual student needs and career goals, and facilitating access to appropriate learning opportunities where relevant and possible. The provision of such support is limited by their own supervision experience and expertise, and their (lack) of understanding of DGAs and their role in facilitating DGA development. The third aspect are the doctoral students'

peers. They provide socio-emotional support, reducing the alienation and loneliness of the doctoral journey. Peers also facilitate awareness of available institutional support, which doctoral students may be unaware of. The development of peer support communities is often facilitated through institutional support structures or collaborative supervision spaces. The fourth aspect is the institution. Institutions provides support through various channels, including departments, faculty, postgraduate support offices and the library. Support is supplementary and includes workshops, courses, induction programmes, retreats and teaching relief. While these structures support primarily academic and research DGAs, the spaces created facilitate socialisation into the academy, and facilitate the hidden curriculum that supports the development of the intrinsic DGAs as well.

Figure 1: Framework of Support for DGA Development



Conclusion

This study explored barriers and facilitators to DGA development from the perspectives of doctoral supervisors, graduates, and students in the SA context. The findings indicate an interplay between institutions, peers, supervisor(s) and the doctoral students themselves in facilitating DGA development, and a framework of support for DGA development was constructed. While doctoral education in SA typically does not have a formalised curriculum, the supervision space is central to developing knowledge expertise and critical thinking skills. Institutional support for supplementary skills development typically focus on academic skills development related to research skills. Across all these spaces and

support structures, there is potential to access the hidden curriculum of unintentional learning and socialisation. A lack of awareness of support availability is a barrier; yet it can be countered by clear information sharing and expectations communicated by institutions, supervisor(s), and peer networks. However, doctoral students, even with equal access and awareness, will not equally engage with the support available, and students need to take initiative in their area of need. All stakeholders in doctoral education have the potential to support or inhibit the development of DGAs, whether in the formalised, informal or hidden curriculum. Every effort should be made to support multiple ways of doing the doctorate, to support the unique journey of each doctoral scholar to make a novel contribution with their study, and to develop their capacity to be a creative problem solver.

Recommendations and Implications

A lack of awareness of available support is a barrier to the utilisation and the development of the corresponding DGAs. Induction or pre-doctoral programmes for doctoral students should be implemented to make them aware of the support available at their institution. It should not be assumed that doctoral students already know about the support available. Such programmes should include orientation to the DGAs that they are expected to develop during the course of their studies, enabling students to intentionally reflect o their development and to seek appropriate support as required. Supervisors should similarly share relevant opportunities available to their students, and do what they can to encourage and facilitate the engagement in varied learning opportunities and experiences. The fast-changing pace of education necessitates the ongoing upskilling of supervisors as to new pedagogical practices and self-reflective consideration of their own practices. Similarly, students need formalised training on supervision practices to prepare them, together with experiential learning, for their individual's career aspirations. The inclusion of a coursework component to the doctorate or pre-doctoral programme would facilitate the provision of such training, without overburdening students with a plethora of supplementary activities. Open discussions around DGA development should take place in the supervision space, and more broadly at HEIs to ensure that doctoral students and supervisors are aware of the attributes that they are developing.

HEIs should support and facilitate spaces for peer mentoring and peer group discussion, as these collegial spaces help overcome the loneliness of the doctorate, and facilitate access to the hidden curriculum. Examples include peer mentoring programmes, group writing retreats, reading groups and interdisciplinary spaces for dialogue and discussion. Many

of these would require funding, but the benefits of student support and development could validate the expense. The implementation of additional interventions and/or forms of support needs to be carefully considered, so as not to overload students and supervisors alike, potentially reducing buy in and capacity to meaningfully engage.

Future research should include longitudinal reflections on how DGAs develop over time, and at which points interventions are required to support DGA development. Institution-specific evaluation of support available may provide insight into specific barriers and facilitators in those contexts. Differential patterns in support requirements for doctoral students who are also staff members at HEIs, as well as support for those on extension or at risk for extension should also be considered, as there may be specific needs for these cohorts. Investigation into interventions for DGAs and evaluations as to their efficacy are necessary. The development of a scale to measure DGAs would be beneficial to identify group differences in attribute development, which may facilitate more targeted skills development to cohorts of students.

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