

MULTI-STAKEHOLDER PERCEPTIONS OF DOCTORAL GRADUATE ATTRIBUTES: A SOUTH AFRICAN PERSPECTIVE

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ABSTRACT

International literature reflects that doctoral graduate attributes (DGAs) include a range of academic, soft skills and personal qualities. This study described multi-stakeholder perceptions of DGAs in the South African higher education context. Fourteen semi-structured interviews were conducted with doctoral students, doctoral graduates and academic staff from four South African higher education institutions. Participants understood DGAs as the outcomes of the doctorate degree, which are developed over time. Participants' experiences of DGAs included discussion of "academic" attributes, which align with the Qualifications Standards for Doctoral Degrees. Participants also discussed a range of personal attributes and "soft skills". Doctoral supervisors focused on the academic attributes, whereas doctoral students and graduates gave comparatively greater weight to the personal qualities that supported the completion of their doctorates. DGAs extend beyond the traditional academic attributes, and include the "soft skills" and personal attributes that are invaluable for completion and employability. South African higher education institutions need to utilise a more comprehensive, dynamic conceptualisation of DGAs, and provide developmental support for both academic and non-academic attributes.

Keywords: Doctoral graduate attributes, doctoral education and training, higher education capacitation, transferable skills, postgraduate retention and throughput, postgraduate education and training

INTRODUCTION

Doctoral education is a strategic focus in the South African (SA) higher education (HE) sector,

for capacitation and participation in the knowledge economy (Molla and Cuthbert 2016). The National Development Plan (NDP) (National Planning Commission 2011), targets significant improvement in doctoral graduation rates and the proportion of academic staff holding doctorates. However, the NDP targets are critiqued as being “ambitious and arguably unrealistic” (McKenna 2017, 459), with institutional capacity as a significant barrier to achieving these goals (Molla and Cuthbert 2016). Despite improved doctoral enrolment (CeSTII 2023), throughput rates remain low. For example, 46 per cent of the national 2006 doctoral cohort graduated in a six-year period (McKenna 2017). Below-target graduation rates have a knock-on effect, impeding improvement in the proportion of academic staff with doctorates, which similarly remains low (DSI 2021).

International concern for graduate employability persists at a doctoral level, with the perception that the doctorate is too specialised and that graduates lack relevant skills for the workplace (Cuthbert and Molla 2014; Boulos 2016; Maxwell and Chopel 2020). However, this perception may be due to the lack of awareness from stakeholders of the scope of transferable skills graduates actually possess (Durette, Fournier, and Lafon 2016). A recent systematic review of literature on doctoral graduate attributes (DGAs) identified that doctoral graduates possess a range of skills, qualities and competencies that are transferable, in complement to their in-depth, specialised knowledge (Senekal, Munnik, and Frantz 2022). Similarly, there is an increased focus on interdisciplinarity and transferable skills development in doctoral education (Granata and Dochy 2016; Bryan and Guccione 2018; Holley 2018). A national SA doctoral tracer study found good evidence of doctoral employability (Mouton et al. 2022). However, approximately 20 per cent of respondents were unable to find employment related to their field of study, highlighting the need for transferable skills and further investigation into the doctoral graduate labour market (Mouton et al. 2022).

Graduate attributes (GAs) are an important tool in the HE context to address areas of concern, such as employability (Bitzer and Withering 2020). Barrie (2006) delineates four approaches to conceptualising graduate attributes: precursory fundamental skillsets; complementary generic skills and learning; translation attributes for knowledge translation and application; and enabling attributes that are future-focused. Faller et al. (2023) apply these conceptual views to the doctoral context in South Africa, arguing that the Doctoral Standards (Council on Higher Education [CHE] 2018) are framed as primarily translation and enabling. In essence, DGAs are therefore both retrospective outcomes from the degree, as well as a future focused view of graduates’ capacity to be productive knowledge agents (Faller et al. 2023). This aligns with Yazdani and Shokooh’s (2018) definition of DGAs, as the qualities or characteristics of a doctoral graduate. There are concerns regarding the conceptual clarity of

GAs and the lack of consensus regarding their definition and operationalisation (Bitzer and Withering 2020; Burton et al. 2022). GAs are frequently integrated into undergraduate curriculums and learning outcomes (Mashiya 2015; Nell and Bosman 2017), yet SA doctoral degrees typically involve original research under supervision (Molla and Cuthbert 2016), without standardised curricula to embed GAs into. Professional doctorates may include a coursework component, yet the majority of doctoral programmes in SA are by thesis (CHE 2022). GAs are developed across multiple contexts, not just the educational context (Bitzer and Withering 2020). GAs include those that are “seen” or explicitly linked to curricula and those that are “unseen”, and while implicit, include crucial employability skills, such as resilience (Kensington-Miller et al. 2018). Similarly, the CHE doctoral review highlighted that GAs “are not explicitly formulated during postgraduate studies but ... their attainment is embedded in the nature of doctoral studies” (CHE 2022, 23). Further, Burton et al. (2022, 2) raise the question of whether “academic role players [are] paying enough attention to the desired attributes and their attainment by doctoral graduates,” given the indications of a “lack of awareness, or depth of understanding” of DGAs indicated in the doctoral review. Therefore, further investigation into stakeholders’ perceptions of DGAs is needed, to identify where the gaps in understanding of DGAs are, and whether this may be explained through the seen-unseen attribute dimension.

GAs are typically institutionally defined, and so there are various lists, models and frameworks of GAs. Larger-scale attempts to create research-related developmental frameworks as guides and frames of reference include the Researcher Development Framework (Vitae 2010) developed in the United Kingdom, and the Researcher Skill Development framework (Willison and O’Regan 2008/2015) developed in Australia. Similarly, a cross-national initiative in Europe developed a competence model for science, engineering and technology PhD students and graduates (Nikol and Lietzmann 2019). These models were all developed in the Global North, and there is limited evidence of such models in the Global South. Senekal et al. (2022, 1) identified a range of DGAs, including “knowledge, research skills, communication skills, organizational skills, interpersonal skills, reputation, scholarship, higher order thinking skills, personal resourcefulness, and active citizenship.” The SA Qualifications Standards for Doctoral Degrees (hereafter referred to as the Doctoral Standards) include a list of five knowledge attributes and four skill attributes (CHE 2018), which may be supplemented by institutional or discipline-specific attributes (CHE 2022). In the SA doctoral review, while some institutions noted that DGAs are evidenced in the thesis report itself, other institutions highlighted the applied and subjective nature of DGAs (CHE 2022). The attainment of these attributes is intrinsically linked to the institutional context, and may be impacted by supervisors’ (lack of) awareness of DGAs (CHE 2022). Therefore, supervisors’ perceptions of DGAs need

to be explored. Students' experiences were only included by a few institutions in the doctoral review (CHE 2022). However, "where personal and professional practice impact is concerned, the student or doctoral graduate 'voice' and perspective is crucial" (Creaton and Anderson 2021, 2). The inclusion of student and graduate perceptions of DGAs, alongside the voices of academic staff is a gap. Therefore, this article aims to explore and describe multi-stakeholder perceptions of DGAs. The concerns regarding a shared vision of DGAs across doctoral stakeholders (Burton et al. 2022; Faller et al. 2023), are clarified, as while stakeholders may not be as familiar with the terminology and conceptual framing of DGAs, they have extensive experiential understanding of DGAs. Furthermore, the article identifies the need for a more inclusive definition of DGAs in the SA HE sector, extending those attributes delineated in the Doctoral Standards, to ensure quality doctoral graduates with a comprehensive skillset.

METHODS

Design and participants

A cross-sectional, descriptive qualitative design was used to describe various stakeholders' perceptions of DGAs in the SA HE context. Explorations of contextual relevance with various stakeholders are particularly pertinent in the SA context (Munnik and Smith 2019), to capture and integrate subjective experiences from various perspectives.

Participants included four doctoral students, three doctoral graduates, six academics who are doctoral supervisors, and one academic in HE quality assurance. Participants were purposefully selected, based on the criteria in Table 1, for a heterogenous sample and maximum variation of perceptions (Emmel 2013). A combined convenience sampling approach included those who were contactable and willing to participate. Of the 22 individuals invited via email to participate, 14 agreed and were interviewed. Interviews continued until there were an equal number of academics to combined graduates and students, to ensure equal representation, and until no new themes or content arose in subsequent interviews, indicating saturation (Bless, Higson-Smith, and Sithole 2013). There were seven female and seven male participants. Participants were primarily in the 30-50-year-old age bracket. Participants were affiliated with four HEIS, for their doctoral studies (for students and graduates) or employment (for academics): The University of the Western Cape (n=6), Stellenbosch University (n=3), the University of KwaZulu-Natal (n=3), and the Central University of Technology (n=2). Participants were from a range of disciplines across humanities, social and natural sciences.

Table 1: Inclusion criteria for participants

| Grouping | Criteria |
|--------------------|--|
| Academic staff | Employed at a SA HEI. 5+ years supervising at doctoral level OR involved in HE quality assurance. |
| Doctoral graduates | Graduated from a SA HEI within last 6 years. |
| Doctoral students | Registered at a SA HEI for at least 2 years OR completed at least part of their data collection. |

Data collection and analysis

Individual semi-structured interviews were conducted via Zoom by the first author between January and April 2022. Interviews were 60–90 minutes long, except for one interview, which was conducted in two parts (120 minutes in total). Interviews explored the participants' perceptions, through their understanding and experiences of DGAs. The interview guide was piloted prior to data collection.

Interviews were transcribed verbatim, with light editing for flow, checked for accuracy, and analysed by thematic analysis. The six-step approach followed included: data familiarisation, initial coding, emerging themes, reviewing themes, defining and naming themes and reporting (Braun and Clarke 2012). A combined inductive-deductive coding approach was used (Vaismoradi, Turunen, and Bondas 2013), with deductive coding of DGAs based on existing research and frameworks, and inductive coding of emerging attributes and other relevant content. Atlas.ti version 9 was used to facilitate coding and theme identification. Participants' groupings are indicated through descriptors as follows: doctoral students (DS), doctoral graduates (DG), academic supervisor (AS) and quality assurance (QA), followed by a number.

Rigour

Rigour was upheld by applying the principles laid out by Bless et al. (2013) and Koonin (2014). Triangulation of sources was achieved through including various stakeholders to support trustworthiness and transferability. Following the thematic analysis stages set out by Braun and Clarke (2012), with a combined inductive and deductive approach, ensured the credibility and confirmability of the data. Clear reporting throughout the study supported the dependability of data. The researchers were mindful of their positioning, own experience, and biases as to the topic, and endeavoured to remain reflexive through supervision and a reflective journal throughout the process. Some of the participants were known to the interviewer, which served to support access to participants and building rapport in the interviews.

Ethical considerations

Ethics clearance was obtained from the Human and Social Science Research Ethics Committee at the University of the Western Cape (HS21/7/19). Gatekeeper permission to collect data from staff, students and/or graduates was obtained from each of the four HEIs represented. Participants signed consent forms for participation and recording of the interview electronically. Participants' identifying details were anonymised to uphold anonymity and maintain confidentiality.

RESULTS

Participants' perceptions of DGAs were categorised by three themes: (1) understanding of DGAs, (2) the academic DGAs, and (3) the "soft" DGAs discussed by participants.

Understanding of DGAs

Participants' understanding of DGAs was explored in the interviews, and is reflected by how they defined DGAs, and the developmental and dimensional nature of DGAs.

Defining DGAs

Participants defined DGAs using a variety of terms, including attitudes, capabilities, competencies, experiences, personality, outcomes, skills and traits. A doctoral supervisor argued that DGAs are poorly formulated, as there are arbitrary distinctions between the terms used, which is compounded by a general lack of understanding of doctorateness. In many instances, participants reflected their uncertainty of what term(s) to use, and their lack of familiarity with the terminology related to DGAs. For example, "I'm not really used to thinking that language" (AS4) and "I don't think I've thought much on that meta kind of level about doctoral attributes" (DS4). Interestingly, the uncertainty in defining DGAs was not only mentioned by doctoral students and graduates, but also by doctoral supervisors. The challenges associated with identifying a formal definition of DGAs was counterbalanced by the experiential discussion of the participants in relation to DGAs (to follow).

Further uncertainty regarding the definition of DGAs was in relation to graduation. Many participants viewed DGAs as outcomes of the doctorate, "that you possess once you complete the qualification, that's developed as part of the study" (DG1). Other participants discussed DGAs in a more process-oriented manner, as the attributes developed while studying. A doctoral student noted that DGAs are aspirational, and "the things that will develop, or will become prominent as you grow within the doctoral journey" (DS2). The future-oriented nature of DGAs was also flagged, as "something that needs to stand you in good stead for the future

and not just for the production of the output of the PhD in the form of the dissertation” (AS3). While DGAs were most commonly thought of as the degree outcomes, they were also noted to develop throughout the doctoral journey, and to play a role after graduation.

Developmental and dimensional nature of DGAs

The seemingly contradictory understanding of DGAs as being both in process and outcomes may be explained if DGAs are considered to be developmental. Participants noted that attributes possessed at Honours and Masters level are built on, extended, deepened or advanced at the doctoral level. Participants referred to the growth that takes place during the doctorate, as attribute development is “still an ongoing [process] and I think those skills continue to develop as I go through the various phases into the PhD” (DS3). Other participants noted that certain attributes would be developed at different stages of the doctorate, highlighting a time-bound aspect of DGA development. As a supervisor noted: “[it is] the continuing nature of education ... phases of education are not distinct but that they do feed into each other” (AS1). While attributes develop across the education spectrum, two supervisors noted that there is more intentionality in attribute development at earlier educational levels than at doctoral level. Some of the doctoral supervisors identified doctoral curriculum design as an area of focus for improving intentional attribute development at a doctoral level. However, curriculum design was not mentioned explicitly by doctoral students or graduates.

Students’ unique journeys mean that not all doctoral graduates will have the same level of attributes, as “naturally some of them will end off better in some areas than others, but they need to at least get to the balance of skills in these areas” (AS3). Despite the different levels of attributes possessed, there should still be commonalities across fields and disciplines, as “the assumption is: a doctorate is a doctorate. So graduate attributes should be graduate attributes immaterial” (AS6). However, discipline-specific attributes need to be considered, as “you need to be responsive to the attributes required in that particular field” (QA1). A level of similarity and shared attributes across doctoral degrees needs to be complemented by differing foci and levels of attributes developed, based on individual doctorate experiences.

The participants had a general understanding of DGAs as being the outcomes of a doctoral degree. They highlighted the developmental and time-bound nature of DGAs, and how they were differentiated by degree level, and the individual and field specific nuance that may apply. While some participants initially expressed uncertainty in defining DGAs, they were able to explain and describe what the term reflects, based on their own lived experiences.

Academic DGAs discussed

The second theme reflected the experiences of academic DGAs discussed by participants. Academic DGAs included academic literacy, cognitive domains, research related domains, and disciplinarity.

Academic literacy

Academic literacy as a DGA included writing, referencing and software skills. All but one participant explicitly mentioned writing as an important DGA. Participants noted that more advanced writing skills at a doctoral level go beyond reproduction, into synthesis, interpretation, argument development and the discovery of one's own voice. The more advanced writing skills may evidence critical thinking skills (addressed below). Some participants identified clear and succinct communication through writing as a transferable skill. Doctoral students and graduates reflected on how their ability to write academically improved significantly during their doctorate, as well as challenges experienced, including writers' block and inconsistent writing productivity. Supervisors agreed that writing is a challenge for many doctoral students, and that they as supervisors, gauge academic writing ability at the start of the doctoral process, to determine how challenging the research process is likely to be. Academic writing is not just a basic skill that is required to pursue a doctorate degree, but also an attribute that is refined and developed during the doctorate itself.

Supervisors and graduates also noted the importance of referencing and technical software skills as part of the academic literacy skillset, including using correct referencing styles and formatting, and using referencing software. Supervisors highlighted the importance of technical skills using Microsoft Word, and familiarity with other software, including Excel, PowerPoint, and data analysis software such as SPSS, Stata or R. Access to software (licensing) was a potential barrier; however, it is "not only the access and the license, but also the operational knowledge" (AS6) that needs to be considered. Use of data analysis software in particular, was an area of growth noted by doctoral students and graduates. Academic literacy included technical skills to use software to support academic tasks, such as writing and data analysis.

Cognitive domains

General academic ability was flagged as important for success in the doctorate, however, "a PhD is a test of endurance, not a test of intellect" (DS1). Participants generally agreed that critical thinking skills were essential for the doctorate, and a transferable skill. Participants described various aspects of critical thinking and reasoning, which included the ability to see connections between ideas, facilitating the clustering and condensing of information. A student

noted how useful critical thinking was in their literature review, and supervisors frequently noted the importance of critical thinking for the write-up, development of logical flow, coherence, and the “golden thread” of the argument. Participants noted that a greater depth of critical thinking and engagement with ideas and research is required at the doctoral level, beyond connecting and describing ideas. One supervisor noted that they “have probably tended to overfocus on higher order thinking skills ... [and] maybe other supervisors might be focused on different areas” (AS1). Supervisors discussed the importance of critical thinking skills to a greater extent than the doctoral students and graduates, who focused more on how critical thinking skills developed during the doctorate.

Problem-solving was another cognitive skill that students and graduates utilised, as “you will encounter quite a few problems along the way doing your studies” (DS2). Participants described problem-solving as the ability to break problems down into smaller parts, being able to see problems from different angles and thinking outside the box. Problem identification was an important skill, both in conceptualisation, but also at the end of the thesis, as “now that you’ve investigated, you’ve opened a whole new perspective of problems that should be looked into” (AS6). Cognitive abilities such as critical thinking and problem-solving were seen as key attributes that develop throughout the doctorate.

A related aspect that was primarily raised by doctoral supervisors was that of creativity and curiosity. Creativity was thought to be misunderstood, despite being one of the most important skills, and it was noted that “creativity [is] actually defined as the ability to see new connections between existing points, and that’s the definition of research. That’s the definition of innovation” (AS2). Supervisors noted the importance of creativity in order to experiment with new approaches and ideas, and pointed to the requirement of the doctorate to make a novel contribution. However, as one supervisor reflected: “I’m just wondering whether one should not encourage students to become more creative” (AS6). The lack of discussion around these domains from the student and graduate perspective highlights a potential gap in awareness of creativity as a DGA.

Research-related domains

All participants discussed the development of research-related GAs during the doctorate. The research skills developed were dependent on the nature of the research conducted, as students will develop “advanced research skills in a particular area. So, I wouldn’t necessarily say you’d need to have advanced skills across a range of paradigms or methodologies” (AS1). Research skills were built on from an Honours and Masters level, yet supervisors noted that research skills were often a gap, and could be a source of anxiety for students.

Participants mentioned a range of skills and competencies related to the various stages of the research process, including knowledge of the research process itself. All participants noted that conceptualisation was a challenging, yet crucial element of the research process. Conceptualisation included the ability to formulate and contextualise a problem, understand the context and background literature, select appropriate methodologies, and write a research proposal. Feasibility, scope, coherence and rigour, were of particular import for supervisors, and were considered when evaluating research proposals.

Most participants elaborated on the skills needed for writing a literature review, that included the basic skills of searching databases, identifying relevant literature, critically reading and evaluating sources, synthesising evidence, and balancing contradicting ideas. Furthermore, literature reviews should be “done in a way that is sensitive to what is already existing, yet can show some critical engagement” (AS3). A literature review was noted to be a cohesive narrative with a clear argument, not just an accumulation of facts, and may also be indicative of the cognitive skills discussed above.

Research skills related to ethics were raised by participants. Ethics clearance processes were noted to be time consuming, yet crucial for the protection of participants. A doctoral graduate, who encountered challenges with unethical practice of a research assistant, discussed the implications in delaying their project, yet for them, “that is something that is obviously non-negotiable, you have to be an ethical person” (DG2). Doctoral graduates were expected to have upheld ethical practice and accountability throughout their projects, and into their professional lives afterwards.

Participants identified that research methodology included a sound and thorough knowledge of methodology, which informed their ability to select appropriate methods. Methodological knowledge was complemented by critical reflection on methods, and creativity in the application and adaptation of methods. Methodology was an area of growth for some, and one participant noted that “one of the main impediments ... is that you’re methodologically not adequately prepared” (DS4). Participants reflected the expectation that doctoral students grow in their understanding and application of research methodologies during their doctorate, and exit with more advanced knowledge and methodological skills.

Data collection skills were briefly mentioned by some participants, in relation to the research process. Of greater focus were data analysis skills, mentioned by all participants, that students particularly struggled with or were unprepared for. One student expressed excitement about the statistical component of their thesis, while another expressed persistent doubt around whether their statistical analysis was executed correctly. While some students may outsource their statistical analysis to experts, supervisors noted the importance of sense-making and

interpreting data, as “analysis interpretation is about your thinking. There’s no right answer. There’s no one single way. So, when you interpret something, you’ve got to justify why you say that” (AS4). Similarly, a doctoral graduate noted that “the ability to write, to put what you have in words ... was more important than the statistical skills” (DG1). The interconnected nature of many attributes is demonstrated, as data analysis skills and interpretation were intricately linked with critical thinking skills and being able to construct and convey a cohesive argument.

Disciplinarity

A novel contribution to the field is one of the key requirements of the doctorate. Knowledge itself is an important DGA, as “this is what the qualification is all about” (AS6). Participants highlighted the importance of expanding one’s knowledge, through substantial reading, and understanding the history and developments of their field. Doctoral students reflected on the intimidating expectation to become an expert and thought leader in a mere five-year time period. However, this view was qualified in that “a PhD doesn’t make you an expert in everything, it makes you an expert in one very particular thing” (DG3). The depth of specialisation and focused expertise in a particular field is generally agreed to be an important attribute of a doctoral graduate.

Participants noted the shift that has taken place in the HE sector towards interdisciplinarity, particularly at a doctoral level. The “knowledge of cognate disciplines” (AS2) and the ability to communicate from a place of shared understanding with people from various disciplines thus become important. Participants noted that interdisciplinarity, in one’s doctorate or work, resulted in broadened connections and access to wider networks. Interdisciplinarity is an important DGA, yet it may be more evident amongst those who had a study that was interdisciplinary in nature.

“Soft” DGA discussed

The third theme reflected another grouping of DGAs; the “soft” or more implicit attributes, that included communication, interpersonal skills, teaching and learning skills, project management and personal attributes.

Communication

All participants reflected on attributes related to communication, as “you need to be able to articulate what it is you want to do or ... are doing, in the most concise, easily digestible form possible” (DS2). Communication was represented in the ability to present a coherent argument

in the proposal and thesis, and to share this articulately with others. In addition to the academic writing skills mentioned above, written communication skills included formal email etiquette. Verbal communication skills included being able to present research findings, nuances of language use and appropriate tones of voice. Systemic issues related to language were an area of concern for some participants, as “there are people that would certainly be penalized for [language], when it ... should not be a metric” (DG3). English proficiency may make the doctorate easier, and may inform the confidence and ease with which students and graduates communicate via written and oral means. However, it is important to consider how language as an attribute informing communication is developed and evaluated equitably.

The dissemination of research findings was discussed by various participants, as “not just being able to conduct research, but being able to share that research effectively with other people” (DS2). Dissemination included conference activities of presentations and critical engagement with peers. However, not all doctoral students and/or graduates are exposed to conferences, which may be contingent on the supervisors’ support of conference attendance. Science communication was specifically raised, as “an awareness of the audience who you are speaking to” (DS3) and skills for “how to apply or how to communicate your work to a broader audience” (AS5). Platforms for communication were noted to have shifted from the traditional conference format, to include mainstream media platforms and social media. The transfer of knowledge may thus include various formats of dissemination.

Skills for journal article publication were emphasised by all participant groups. Students and graduates reflected on the intimidating process of getting the first article published, and needing “very thick skin” (DG1) to deal with reviewer feedback. Publishing with co-authors, such as supervisors, was noted to assist in developing one’s article writing skills. Working with co-authors helped to develop collaborative skills in negotiating the process, allocation of work, authorship, conceptualisation, and writing. Students and graduates noted that publishing during or from their doctorate helped to build confidence and credibility, as “that shows that other people have read your work and they have peer reviewed it, and they thought it was good enough to publish” (DS2). Doctoral supervisors noted that students who do their thesis by publication were often more prepared for article writing. However, as one supervisor noted, not all students are equally suited to pursuing a doctorate by publication. Skills related to publishing were variably developed during the doctorate, in part, depending on the type of doctorate (by monograph or publication), and support and encouragement from the supervisor to pursue publication during or after the doctorate.

Interpersonal skills

Participants noted that interpersonal skills were learned by experience, not formally taught. Interpersonal skills mentioned included leadership, the ability to work in a team, to collaborate, to network, and appropriate etiquette in engagement with senior colleagues and/or government officials (depending on the nature of the research). A doctoral graduate noted that interpersonal skills were the most valuable attributes they developed, and “that [they] allow you to operate and bring your research expertise and experience to the table” (DG3). Teamwork and collaboration related to students’ engagement with others as part of the research process, both in data collection and supplementary support, and were noted to be transferable skills. Related skills included rapport building and negotiation skills. Collaboration and/or teamwork may take place within one’s institution, or across institutions or organisations. However, a doctoral supervisor argued that collaboration and teamwork “would only come about if you were involved in a [larger] project” (AS4), as opposed to an individual project. In support of this assertion, participants whose doctorate was part of a larger project, discussed collaboration and teamwork in more detail than those whose doctorate was an individual project. Collaboration may be limited to the supervisor, in an individual project, “but it’s not really a fair collaboration, because there’s a power difference ... [which is not] in the true sense, a collaboration” (AS3). Networking is a related skillset, that involves “putting yourself out there” (DS1), and making use of available opportunities, which sets one up for future collaborations. A doctoral student noted that they found networking intimidating and challenging. Networking is experiential, and more of a “by-product ... I don’t know if these are intended things that the PhD must do” (AS4). Leadership was nominally mentioned by doctoral students, in relation to mentoring and lab management. A doctoral supervisor argued that leadership is not a short-term outcome of the doctorate, as a recent graduate is more likely to join than lead a research team. Interpersonal skills appear to be dependent on the exposure and experiences of the individual in and around the doctorate, rather than a direct result of the doctorate itself.

Teaching and learning skills

Participants discussed skills for teaching, lecturing and research supervision. Teaching is related to knowledge translation, as one graduate noted, “you can understand for yourself, but explaining too, I think that’s a skill, because not everybody is able to teach” (DS3). However, the development of this skillset may be dependent on exposure, as not all doctoral students engage in lecturing, which one doctoral student viewed as a shortcoming. Others noted that formal pedagogical training was lacking, as “there’s the assumption that because you’re an academic, you know to teach, which is of course a flawed assumption” (AS5). Some students

and graduates noted that their engagement with students also involved mentorship. The development of supervision skills was primarily mentioned by doctoral supervisors. Supervision skills are listed as a National Qualifications Framework outcome for the doctorate, but doctoral supervisors questioned the preparation that takes place, due to the lack of formalised supervision training. One supervisor noted that graduates “would be able to supervise, from their own experience of supervision, but I don’t think all PhDs necessarily lead to those skills” (AS4). Participants noted that few students gain experience with supervision during their doctorate, as some institutions do not allow one to supervise while studying, with the potential exception of those who were employed as academic staff. The pattern of exposure-dependent skills development applies for both teaching and supervision skills. Participants identified the need for formalised skills development in these areas.

Project management

Project management was discussed by all but one participant. As a doctoral student, “you run the project yourself” (DS1). The supervisor may provide guidance, but the student is responsible for the work plan, ethics clearance, managing participants, and managing their own investment throughout the project. Project management was viewed as a transferable skill, and included time management, financial management and resource management. Time management related to the ability to plan and set goals, set aside time for tasks, and meet deadlines. Financial management related to grant writing, funding and budgeting, and an “awareness of the fact that research is expensive and ... mitigate[ing] some of those factors through effective design” (DG3). Doctoral graduates highlighted project management as an area they grew in, and as a result, “I can balance things much better. I can handle multiple work demands. I can dedicate timelines to deliverables” (DG2). Some doctoral supervisors reflected on the importance of framing the doctorate as a project, and the benefit of teaching project management skills to their students. However, other supervisors reflected that the inclusion of project management skills is an area of growth needed in their supervision practice. One supervisor was sceptical about whether project management would be an attribute, as their view of project management was in the context of large team research projects, which they felt doctoral graduates would not be equipped for. Despite differing emphasis on the part of supervisors, project management is important for doctoral development.

Personal attributes

Participants noted that personal, intrinsic attributes were needed for success in the doctorate, and were crucial for combatting and persevering through burnout. Similarly, a supervisor noted,

“unfortunately, I’ve seen cases where the person did not complete based on [lacking personal attributes]” (AS3). However, another supervisor felt that the personal dimensions were indirect outcomes of the doctorate, and argued that, as supervisors, “we’re only here to supervise the project [and] stay away from the personal” (AS5). Many participants affirmed the importance of personal attributes, particularly in relation to success and completion, however, there may not be sufficient active engagement with these attributes during supervision.

Ownership, agency and independence were discussed primarily by doctoral students and graduates. Students particularly noted the importance of needing to take ownership of the research project, as it is primarily an individual exercise. Supervisors agreed, noting the importance of investment, taking responsibility of the project, autonomy and being able to work interdependently. However, this does not mean that the student should “have to do it all by [themselves], meaning no motivation, no support” (AS6). A supervisor reflected that they were perhaps too directive in their supervisory process, which may inhibit their students from developing autonomy. Students are encouraged to take ownership and responsibility for their project, yet this is sometimes countered with pushback from their supervisors, as the supervisor wishes to retain some influence or control over the process. Another supervisor flagged that while independence is an outcome of the doctorate, students should not be expected to be independent up front, which is often the case. Furthermore, they argued that the focus should rather be on interdependence, “because it’s not about whether you can work alone, it’s about whether you ... [are] able to work in teams to produce knowledge. That, actually, is what we want” (AS2). Interdependence may better reflect the views of the participants, as it captures the collaborative nature of research, and facilitates greater levels of developmentally appropriate support from the supervisor throughout the process, as opposed to expecting full independence from the start.

Network orientation was identified as an important dimension, which is more closely aligned with “interdependence” as a DGA, instead of “independence”. Network orientation is the “predisposition to use networks” (AS2), “identifying and working with a support base” (AS3), proactively reaching out, and asking for help when needed. Asking for help was sometimes hard for students, who reflected on needing to “put aside your pride” (DS2), and having the perception that “I should do this myself” (DS4). However, students and graduates reflected on the difference that making use of available support can make, for supporting their progress.

Doctoral students and graduates particularly focused on resilience as a DGA, which included patience, bravery, grit, endurance, perseverance and determination. As one student noted, “it’s not about intelligence at all. It’s just about how gritty you are” (DS4). Qualities

related to resilience helped navigate the challenges experienced in the doctorate journey, where “you take two steps forward and sometimes three steps back” (DS3). Supervisors mentioned determination and resilience as being important, but did not place as much emphasis on it as the students and graduates did. Resilience is another DGA that is invaluable for doctoral success and completion, but which is not often explicitly taught or supported.

Adaptability is a quality that may be particularly useful, alongside resilience, in adjusting to the challenges encountered in the doctorate, as “so much slows you down: pandemics, war, #FeesMustFall” (DS1). Adaptability means being able to identify what is not working, accept it, adjust goals, and “roll with the punches” (DS4), particularly when getting feedback from supervisors. However, it was noted that adaptability is not without risk “because, if you change it completely, then you almost undermine yourself” (AS4). Adaptability should be closely linked with project ownership, mentioned above, to ensure that any changes or adjustments are carefully considered.

Another related attribute is that of self-management. Participants reflected on the importance of self-discipline, self-care, and maintaining a work-life balance. Participants reflected on how important self-care of one’s mental, physical and emotional health is, including diet, exercise, sleep, and stress management. While “lots of late nights [and] lots of weekends [are] part of the parcel” (DG2), negotiating expectations and boundaries with loved ones, to maintain a healthy work-life balance was important. As one student put it, “it cannot consume your whole life ... there has to be a balance” (DS1). Self-discipline was needed to maintain balance and boundaries, and was noted as something that can be developed and improved. Self-regulated and self-directed learning were discussed by one participant in relation to the doctorate. They argued that initially, one may be more self-regulated, where “you manage your time, but [your supervisor] has given you the objectives” (DS2). Throughout the doctorate, self-regulation progresses to self-direction, where the individual is now “able to manage and choose their own objectives” (DS2). The shift may mirror the progression from dependence to independence.

The final intrinsic attribute was that of lifelong learning. Being a lifelong learner, i.e., being teachable, open and non-defensive when engaging with criticism and feedback, was discussed alongside the humility of “not thinking you can do everything yourself” (DS4). Lifelong learning reflects an attitude that results in the continual building of knowledge, and the application of learning in evidence-based practice, which is particularly important “because things are always changing” (DS2). A supervisor argued that lifelong learning has greater import than the specialised knowledge of the doctorate, as the latter has a limited period of relevance.

The cluster of intrinsic, personal attributes reflects qualities, skills and traits that were

particularly important for supporting completion and success in the doctorate, through helping students navigate, balance and endure the challenges they inevitably encounter. However, participants reflected that these attributes were not formally taught in the doctorate or commonly engaged with during supervision. While some supervisors indicated awareness and affirmation of the import of these attributes, there was notably less emphasis given in comparison to the doctoral students and graduates. Furthermore, there was also evidence of reluctance to actively engage with the personal dimensions in the supervisory context, despite the import of these attributes in supporting completion.

DISCUSSION

Understanding of DGA

The findings explored and described stakeholders' understanding and experiences of DGAs, in the SA context. Participants were able to generally describe what the term "doctoral graduate attributes" means, although many – including supervisors, students and graduates – expressed uncertainty regarding defining it. The uncertainty in defining DGAs provides supporting evidence for the concern that varying levels of supervisors' awareness of DGAs may impact on the development of these attributes (CHE 2022). There is a general concern about the lack of conceptual clarity when defining GAs, which is therefore not a degree or context specific issue (Bitzer and Withering 2020; Mowbray and Halse 2010). In a systematic review by Senekal et al. (2022) frameworks and models for DGAs, such as the Doctoral Standards (CHE 2018) and the Researcher Development Framework (Willison and O'Regan 2008/2015), are infrequently utilised in published research, indicating a disconnection between the frameworks' development and application in the research context. This disconnection may extend to the applied context, for example, in research supervision and doctoral training, as indicated by the uncertainty participants expressed in defining DGAs. However, there was general agreement by participants as to DGAs relating to the degree outcomes, and that they include a range of domains, including skills, attitudes and competencies, which align with the definitions of DGAs by Yazdani and Shokooh (2018) and the Doctoral Standards (CHE 2018). The developmental nature of DGAs, leading on from previous degree exposure and experience, aligns with the shift in the literature that focuses on the doctorate being a developmental process, as opposed to focusing primarily on the production of the thesis (Creaton and Anderson 2021; Durette et al. 2016; Mowbray and Halse 2010). Furthermore, individuals may develop varying levels of different attributes, depending on their exposure, type of degree, field of study and the institution of study. Contextually, the individual differences in DGA development is reflected in doctoral review (CHE 2022), which states that the CHE list of DGAs may be supplemented

with institutional or discipline-specific attributes. Differences in DGA development may also be informed by varying experiences during the doctorate, such as conference attendance, publication, collaboration and lecturing or supervision. GAs in general are developed across various contexts (Bitzer and Withering 2020), and thus the individual exposure of the student during the doctorate may account for the development of certain attributes to a greater degree than others.

Conceptualisation of DGAs

The participants reflect all four of the conceptualisations of GA presented by Barrie (2006). Participants identify precursory attributes in the various skills that are required in order to participate in a doctoral degree, achieved in their prior training (Faller et al. 2023), including a base level of research skills, critical thinking and writing ability. However, these attributes are both precursory attributes and attributes that are further developed and enhanced throughout the doctorate. Faller et al. (2023) argued that complementary attributes are more relevant at an undergraduate than a postgraduate level. However, participants described experiences that are not formal complementary components of the degree, such as publication, conference attendance and collaboration, which served to develop complementary attributes, for example, interpersonal skills for communication, networking and collaboration. The shift to more structured and collaborative doctoral pedagogies (McKenna and van Schalkwyk 2023) means that the complementary conceptualisation may be particularly useful for formalising the development of complementary transferable skills that are important for employability and long-term research productivity. The findings highlight the contextual application of DGAs, and how the topic and nature of the research may influence the attributes developed. This reflects the translation conceptualisation of GAs, and acknowledges the influence of disciplinary differences and institutional differences on DGA development (Faller et al. 2023). Lastly, the enabling conceptualisation of GAs is reflected, as participants noted the interconnected nature of DGAs, as well as the focus on active citizenship and the transformative application of research. Barrie (2006) considers these approaches as hierarchical rather than contradictory. The findings highlight the importance of all of these attributes and conceptualisation being held together, where in some instances, supervisors (for example), may favour one approach and not consider another approach as equally important. However, an integrated view is required to ensure a comprehensive, dynamic understanding of DGAs that may be applied and tailored to all doctoral students.

Contextual relevance

The participants identified a wide range of DGAs in their discussion of their understanding and

experiences thereof. There is good alignment with the list in the Doctoral Standards (CHE 2018), as demonstrated in Table 2. Interestingly, there were various domains that were not covered in the Doctoral Standards, including interpersonal skills, teaching and learning, and project management. One aspect of personal intrinsic attributes was covered, but not the full range of personal attributes that were discussed by the participants.

Table 2: Comparison of DGA from interviews to those in the Doctoral Degrees Qualifications Standard (CHE 2018)

| DGAs from interviews | DGAs in the Standards (CHE 2018) |
|---|---|
| Academic literacy <ul style="list-style-type: none"> • Writing • Referencing • Software skills | Skills: <ul style="list-style-type: none"> • Relevant information and digital literacy skills |
| Cognitive domains <ul style="list-style-type: none"> • Critical thinking • Problem-solving • Creativity and curiosity | Knowledge: <ul style="list-style-type: none"> • An original contribution to the field of study Skills: <ul style="list-style-type: none"> • Critical and analytical thinking for problem-solving |
| Research-related <ul style="list-style-type: none"> • Research process • Conceptualisation • Literature review • Research ethics • Methodology • Data collection and analysis | Knowledge: <ul style="list-style-type: none"> • Ethical awareness in research and professional conduct Skills: <ul style="list-style-type: none"> • Evaluation, selection and application of appropriate research approaches, methodologies, and processes in the pursuit of a research objective |
| Disciplinarity <ul style="list-style-type: none"> • Novel contribution to the field • Depth of knowledge • Interdisciplinarity | Knowledge: <ul style="list-style-type: none"> • Broad, well-informed, and current knowledge of field or discipline • Expert, specialised, and in-depth current knowledge of specific area of research • Insight into the interconnectedness of one's topic of research with other cognate fields |
| Communication <ul style="list-style-type: none"> • Articulate and concise • Verbal communication • Presentation of findings: academic and general public • Journal articles | Skills: <ul style="list-style-type: none"> • Communication skills |
| Interpersonal <ul style="list-style-type: none"> • Teamwork and collaboration • Networking • Leadership | |
| Teaching and learning <ul style="list-style-type: none"> • Teaching as knowledge transfer • Research supervision | |
| Project management <ul style="list-style-type: none"> • Time management • Financial management • Resource management | |
| Personal attributes <ul style="list-style-type: none"> • Ownership, agency, and independence • Network orientation • Resilience • Adaptability • Self-management • Life-long learning | Skills: <ul style="list-style-type: none"> • Reflection and autonomy |

The Doctoral Standards cover primarily the traditional “academic” domains that were clearly

linked to the doctorate degree and explicit in the degree processes. The focus on academic domains is fairly common in existing models of researcher or GAs (Nikol and Lietzmann 2019; Willison and O'Regan 2008/2015). However, there is a large grouping of GAs that were regarded to be essential for the doctorate, both for success in the programme, such as the personal qualities of resilience and self-management, and attributes that were transferable for employment, such as interpersonal skills, teaching and learning skills, and project management. The inclusion of transferable and personal attributes is in alignment with recent literature on DGAs, that highlights a wider range of attributes than is traditionally conceptualised (Senekal et al. 2022; Durette et al. 2016). The non-academic attributes may be further explained by the differentiation of “seen” attributes that are more explicit and observable, and the “unseen” attributes that may be more implicitly developed (Kensington-Miller et al. 2018). The shift in the literature from focusing on the doctorate “product” to highlighting the personal growth and identity development that takes place during the doctorate (Creaton and Anderson 2021; Durette et al. 2016; Mowbray and Halse 2010), affirms the addition of the “soft” skills and personal qualities, as these attributes play a significant role in supporting doctoral success and completion.

Multiple stakeholder perspectives

The voices of doctoral students and graduates alongside those of doctoral supervisors and academic staff were heard. While participants generally reflected on a range of attributes, each interview had a general emphasis on certain clusters over others. For example, one participant particularly focused on communication, whereas another gave more focus to the interpersonal skills developed. In general, doctoral supervisors provided greater emphasis and depth of discussion around the more traditionally “academic” attributes, with some questioning whether the other attributes should be included as DGAs, as they were indirect outcomes or by-products of the doctorate. The “academic” attributes, especially writing and data analysis, were identified by participants across the board, as areas that doctoral students found challenging. Therefore, it may be appropriate that these are areas of focus for supervision. Comparatively, doctoral students and graduates gave greater focus to the personal and intrinsic attributes, emphasising how important these were for their personal growth and development, supporting completion and impacting their functioning after graduation. Some supervisors acknowledged the importance of the personal attributes, however, there were supervisors who were reluctant to engage with personal dimensions in supervision, asserting that the supervisory relationship is primarily an academic one. The findings affirm the statement in the doctoral review that DGA development is impacted by the varying levels of supervisors’ awareness of DGAs (CHE 2022).

Furthermore, the findings highlight the importance of including student and graduate voices alongside academic staff voices, particularly in relation to personal and professional practice (Creaton and Anderson 2021).

Strengths and limitations

The study included student and graduate voices alongside that of supervisors, thus giving a more balanced understanding and view of stakeholders' understandings and experiences of DGAs in the SA context. The study was, by design, descriptive and subjective, and the findings cannot be generalised. However, the range of participants involved supports the transferability of the findings, and gives evidence for concerns already noted in the doctoral review (CHE 2022).

CONCLUSION

The study found that, while there may appear to be a lack of understanding and familiarity with the terminology and concepts of DGAs, doctoral students, graduates and supervisors demonstrated extensive experiential understanding of DGAs. There was a shared understanding of DGAs as the outcomes of the doctorate degree, which are developed over time, both in building on previous experiences and through the academic and additional experiences that take place during the doctorate. A range of attributes were discussed, covering the more explicit academic domains identified in the Doctoral Standards (CHE 2018). However, there was also extensive discussion of other intrinsic or implicit attributes, including interpersonal skills, teaching and learning skills, project management and personal attributes. An integrated conceptualisation of DGAs is needed in order to present a dynamic and comprehensive understanding of the attributes doctoral graduates possess. In the SA context, DGAs extend beyond the traditional academic attributes, and should also consider the "soft skills" and personal attributes that are invaluable for completion and employability.

Implications and recommendations

Interventions to improve shared understanding of DGAs among SA HEI stakeholders should facilitate stakeholders connecting their experiences with terminology and frames for DGAs, such as the Doctoral Standards. SA HEIs should consider extending their GA lists to better reflect the range of DGAs reflected in the article. The range of identified DGAs are not unique, but were aligned to a review of international literature on the topic (Senekal et al. 2022). The present study provides confirmation of the contextual relevance of including a broader range of DGAs. As SA is a leader in HE in Africa, this integrated view of DGAs may be considered by

HEIs in Africa. A large proportion of the doctoral cohort in SA are from other African countries, and so the preparation of those doctorate graduates will feed into those HEIs and innovation systems as well.

“Unseen” or intrinsic attributes require greater support for development (Kensington-Miller et al. 2018). Doctoral supervisors should take a broader understanding of DGAs into consideration in their supervisory practices, to ensure that they are supporting the development of the full range of attributes. Greater awareness amongst prospective and current students and graduates as to the range of attributes that are needed for, developed during, and are outcomes of the doctorate, may facilitate improved engagement with the development of their attributes, which in turn may support doctoral retention and throughput.

The shift towards more structured and collaborative models of doctoral education (McKenna and Van Schalkwyk 2023), may include modules targeting the development of specific graduate attributes, such as critical thinking, which was flagged by Burton et al (2022) as a need in SA’s doctoral education. Short course or modules developed to support DGA development may be implemented collaboratively with partner HEIs in Africa, and internationally, to build collaborative networks and increase exposure for doctoral graduates. Complementary experiences during the doctorate, such as publication, conference attendance and collaborative projects, may also facilitate the development of complementary attributes for long-term research productivity, such as networking, advanced communication skills, and collaborative skills.

Additional research into how DGAs are developed, may inform the provision of cognitive and non-cognitive supportive measures and interventions to enhance the intentional development of the full range of DGAs (Frantz et al. 2021). Additionally, the development of context-relevant instruments to measure DGAs, may be beneficial for quality assurance, and investigating differential patterns of development, for example, by institution or field of study. Such instruments could serve to support the national efforts to improve the quality of doctoral education provision in the country.

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