



Enhancing Doctoral Supervision Practices in Africa: Reflection on the CARTA Approach

Lenore Manderson*, Göran Bondjers**, Chimaraoke Izugbara***,
Donald C. Cole****, Omar Egesah*****, Alex Ezeh*****,
Sharon Fonn*****

Abstract

High quality research supervision is crucial for PhD training, yet it continues to pose challenges globally with important contextual factors impacting the quality of supervision. This article reports on responses to these challenges by a multi-institutional sub-Saharan Africa initiative (CARTA) at institutional, faculty and PhD fellow levels. The article describes the pedagogical approaches and structural mechanisms used to enhance supervision among supervisors of CARTA fellows. These include residential training for supervisors, and supervision contracts between primary supervisors and PhD fellows. The authors reflect on the processes and experiences of improving PhD supervision, and suggest research questions that CARTA and other training programmes could pursue in relation to PhD supervision in Africa and other lower- and middle-income countries.

Keywords: African higher education, doctoral training, collaboration, supervision, contracts, research capacity strengthening

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- * Professor, School of Public Health, University of the Witwatersrand, South Africa.
Email: lenore.manderson@wits.ac.za
- ** Professor, Sahlgrenska Academy, University of Gothenburg, Sweden.
Email: goran.bondjers@sahlgrenska.gu.se
- *** Head of Population Dynamics and Reproductive Health, African Population and Health Research Center, Kenya. Email: cizugbara@aphrc.org
- **** Professor, Dalla Lana School of Public Health University of Toronto, Canada.
Email: donald.cole@utoronto.ca
- ***** Associate Professor, Department of Anthropology, Moi University, Kenya.
Email: omagesa@gmail.com
- ***** Professor, School of Public Health, University of the Witwatersrand, South Africa.
Email: acezeh@gmail.com
- ***** Professor, School of Public Health University of the Witwatersrand, South Africa.
Email: sharon.fonn@wits.ac.za

Résumé

La supervision de recherches de haute qualité est cruciale pour la formation en doctorat, mais elle demeure un problème au niveau mondial, avec des facteurs contextuels importants qui impactent la qualité de la supervision. Cet article rend compte de réponses à ces défis par une initiative multi-institutionnelle pour l'Afrique subsaharienne (CARTA) aux niveaux institutionnel, professoral et des doctorants. Il décrit les approches pédagogiques et les mécanismes structurels que nous avons utilisés pour améliorer la supervision de boursiers à travers le programme CARTA. Ceux-ci incluent la formation résidentielle des superviseurs et les contrats de supervision entre superviseurs principaux et doctorants. Les auteurs réfléchissent au processus et aux expériences d'amélioration de la supervision de doctorants et suggérons des questions de recherche que CARTA et d'autres programmes de formation pourraient approfondir dans la supervision de doctorants en Afrique et dans d'autres pays à revenu faible ou intermédiaire.

Mots-clés : enseignement supérieur africain, formation doctorale, collaboration, supervision, contrats, renforcement des capacités de recherche

Supervision is central to PhD training, amidst the plethora of models of doctorates worldwide (Louw and Muller 2014, Powell and Green 2007). Even with coursework, individual success is influenced by the quality of supervision, professional support, and guidance to students on their research, analysis and writing (Kiley 2011). Growing attention has been paid to the relationship of supervision progress through doctoral candidature, and its association with throughput and completion (Kandiko and Kinchin 2012; Platow 2012; Gill and Burnard 2008; Hockey 1996). This has been especially important where PhD level enrolment, quality of training and completion rates are linked to university infrastructure funds and prestige (McCallin and Nayar 2012; Hakala 2009).

In many universities in Anglophone Africa, the duration of studies, the role of coursework, the role of primary or sole supervisor, and dissertation examination are modeled on doctoral education as delivered historically in the United Kingdom (UK), or other European universities (Cross and Backhouse 2014). In general, the supervisor is expected to guide their student through: identifying and critically interpreting relevant literature; developing the research protocol and gaining skills in appropriate methods; conducting original research; managing and analysing the data; and writing up their research for external examination. However, not all supervisors recognize these responsibilities (Lessing 2011). Postgraduate students may, in some cases, rank such supervision as having limited importance (Duze 2010), although in other cases, they recognize its importance along with other support during

doctoral training (Nakanjako *et al.* 2014). Good supervision, however, includes constructive criticism to which a PhD candidate is able to respond (Ives and Rowley 2005; Li and Seale 2007), the socialisation of students into academia, and the provision of institutional and personal support to the candidate as an emerging and critical scholar (Dietz *et al.* 2006). These are ideals, though they are not always met (Powell and Green 2007).

Although many challenges in doctoral training are generic, universities and research institutions in Africa face particular difficulties of a greater scale (Guwatudde *et al.* 2013). Academics typically have large classes of undergraduate and graduate students, and limited time for individual supervision and their own research and writing. Senior academics often carry substantial professional and administrative duties and may be required to participate in university governance. Conditions of employment – and in some settings the need to take on additional work to supplement income – may limit their capacity to supervise effectively. Departmental hierarchies may influence who is available for and can accept graduate students, reflecting the status associated with higher degree supervision compared with classroom teaching. Furthermore, senior academic attitudes towards graduate students, including in relation to gender and family obligations, can shape their ideas of student capacity, decisions about the research topic, expectations regarding independent work, and the frequency and quality of advice. Often, supervisors simply interact with their own students as they were supervised, and/or they learn by doing (Halse 2011). As noted by Dietz and colleagues, reflecting on South African PhD supervisors (2006: 11):

Few supervisors are selected on, let alone trained in, advanced methods of supervision. Appointed supervisors therefore seldom have a conceptual map of what constitutes acceptable supervision. Supervisors themselves are often the products of poor supervision, and do not therefore hold experience of what constitutes competent supervision.

Worldwide, universities have moved to make supervisor training compulsory to enhance the quality of doctoral training. In Europe, this has been addressed in discussions on strengthening research capacity within a ‘Europe of Knowledge’, leading to the Salzburg Principles of 2005, and its later iterations, of (inter alia) research excellence, interdisciplinary options and transferability of skills (EUA (European Universities Association), 2005, 2010). Similar reflection and practical steps have been taken at a country level, for example, in Spain (Mora *et al.* 2011) and Australia (Kiley 2011; Marsh *et al.* 2002; Pearson 1996). In Kenya, public universities have been asked by the Ministry of Higher Education and the Commission for Higher Education to examine and improve higher degree training and supervision.

In this article, we report on our experience in enhancing doctoral supervision within a more comprehensive program designed to strengthen research capacity in nine universities and three research institutes across seven countries in Sub-Saharan Africa. The field of Population and Public Health was chosen based on the following rationale (Ezeh *et al.* 2010: 2):

To address the rising burden of diseases, improve health systems, and attain better health, the continent needs strong public health research capacity. Countries with a weak population and public health research capacity have limited capacity to identify and prioritize their health needs and, hence, are unable to develop and implement effective interventions to promote well-being. Strengthened capacity to understand the determinants of health in relation to gender, ethnicity, cohorts, and communities among different African populations holds the key to effective interventions to improve health outcomes and health systems in the region.

Carta's Doctoral Fellow and Supervisor Training

In the Consortium for Advanced Research Training in Africa – hereafter, CARTA – a number of universities and affiliated research institutes collaborate to provide doctoral training and institutional capacity building in population and public health. This was conceptualised as a strategy to increase local research strength and reduce the drift of highly trained scholars from African countries to other ('northern') research settings (Ezeh *et al.* 2010). The first cohort of CARTA fellows, from diverse disciplinary backgrounds, commenced their doctoral studies in early 2010. They set out their experience of the programme as a complement to that of their training institution (Adedokun *et al.* 2014). By the fifth cohort, 148 academics from the member institutions – from Kenya, Nigeria, Malawi, Rwanda, South Africa, Tanzania and Uganda – were awarded doctoral fellowships. These fellowships included four residential study programmes of three to four weeks, interim online training, a stipend which supplemented their usual salary, financial support for field research, publishing and conference attendance, post-doctoral fellowship opportunities and re-entry grants. Below, we briefly describe our multidisciplinary approach to training fellows (see also Fonn *et al.* 2016), before discussing our approach to supporting supervisors and strengthening supervision relationships.

In the CARTA programme, fellows are provided with extensive skills-based training and ways of developing cognitive competencies, including the capacity to theorise and develop critical thinking through a specific pedagogic model centred on the participants (Fonn *et al.* 2016). Upon

enrolment, the fellows are set online tasks, while they also choose or meet their supervisor(s). In March, they participate in intensive training in disciplinary, epistemological, conceptual and theoretical perspectives of public and population health, at a residential programme referred to as JAS 1 (Joint Advanced Seminars). In November of the same year, in JAS 2, fellows reconvene for a month for methods training and to finalise their research protocol. After data collection is complete (about one and a half years later), fellows attend JAS 3, which is held over three weeks and focuses on data analysis and writing. In the final residential programme, JAS 4, completing fellows participate in the facilitation of a new cohort of JAS 1 fellows and attend their own sessions on grant writing and professional development, including reflection on supervision.

The majority of CARTA fellows already have experience in training and supervising the research projects of master's students; in some cases, they have also supported PhD students' research due to their own unique skills. We have developed strategies that recognise these diverse experiences of fellows and their supervisors. The four JASs provide fellows from their own and other cohorts with opportunities to compare supervisory and other PhD experiences, and to share how to address supervisory problems and improve their own practices. Parallel with the fellows' curriculum summarised above, we designed a set of activities involving supervisors in order to inform them about the CARTA programme, exemplify its values and pedagogic approach, and support good quality supervision. As set out in Table 1, during the period under review, 179 academics from CARTA institutions were involved as supervisors to CARTA fellows, and so participated in the programme designed to support them in this capacity.

Table 1: Number of supervisors by entry year of CARTA doctoral fellows

Entry year of CARTA fellows	Cohort	Supervisors*
2010-2011	1	40
2011-2012	2	39
2012-2013	3	28
2013-2014	4	30
2014-2015	5	42
Total		179

*Admitted fellows N=148. Some fellows had or have > 2 supervisors, and some supervisors supervise > 1 CARTA fellow in different cohorts

In CARTA institutions, there is considerable variation in the number of PhDs supervised by individual supervisors, the administrative structures supporting graduate student training, research infrastructure, academic opportunities to lead research programmes and publish, and the research culture of departments. CARTA fellows and supervisors come from diverse disciplinary backgrounds, reflecting the multi-disciplinary and mix of fields in public and population health. With this diversity, however, challenges within supervision are more likely to occur. Supervisors bring to their practice different epistemologies and methodologies reflecting their own backgrounds, but also different expectations of students and traditions of and pedagogical approaches to supervision (Lee 2008, 2012). This may include their desire to emulate perceived 'best practice' supervision, but what constitutes 'best practice' is hard to codify, can vary substantially by discipline, and may not meet the shifting needs of students at different points in their candidature. Even so, as we argue below, structures, processes and support systems provide the mechanisms to minimise the subjectivities of doctoral supervision, in order to ensure quality training, good research, and student success.

Evaluation Methods

The challenge in evaluating a programme to support supervision is the reality that assessment of success is relative, and higher degree students may withdraw or proceed, submit and graduate despite a wide variation in the quality of their supervision. The research data on which we draw in this article derive from process documentation, formal and informal interviews conducted as a component of commissioned evaluations, 'town hall' discussions and other individual and group discussions with doctoral fellows and supervisors, graduates, and seminar and workshop facilitators. These meetings, conversations, and evaluations were gathered from the inception of the CARTA programme, with the documentation and summary reports presented to annual CARTA Board of Management meetings. Data also derive from RAND evaluations conducted for the Wellcome Trust (the primary funding agency), with such information incorporated into further funding applications and used to shape the curriculum as it continually evolved. Additionally, when starting this article, all authors met together in Malawi from 13-15 September 2014, following three months of preliminary online discussion and data collection. We also drew on a review of CARTA conducted in 2015 by the consulting company Indvelop Sweden (Christoplos *et al.* 2015), particularly the review's interviews of CARTA fellows and supervisors.

Supervisor Workshops

For each cohort, as described further below, all supervisors have been invited and funded to attend a supervisor workshop, interact with CARTA fellows and facilitators, and sit in on lectures and roundtables. Through these, CARTA facilitators (including members of the authorship team) were able to engage in dialogue with supervisors and share CARTA values and aspirations. The supervisor workshops, based on internationally benchmarked content (Dietz *et al.* 2006) and adapted to African universities and research context, addressed certain skills needed and challenges faced by supervisors in the course of supervising, and by students, when pursuing a doctorate with CARTA. Within a broader framework of “what range and level of work constitutes a PhD”, discussions with supervisors included the following topics: adequate description of the research problem; the process and nature of a comprehensive and critical literature review; development of the research protocol; execution of the project; awareness of diverse ethical issues (Lofstrom and Pyhalto 2014; Kjellstrom *et al.* 2010); skilful analysis and interpretation of data; timely writing and completion; and examination and responding to negative evaluations of the dissertation. Questions related to research design and robustness of data were most often addressed in sessions with fellows attended by supervisors, including research ‘clinics’ that also involved other academics with content expertise.

In workshop sessions, facilitators and participating supervisors also explored the social, economic and personal reasons that affected student progress, with opportunities provided for supervisors to discuss challenges that they have already experienced or that they might anticipate: conflicts with students or co-supervisors in terms of research paradigms or progress; personality differences and conflict resolution; communication and responsibility (Gill and Burnard 2008; Gunnarsson *et al.* 2013). Financial difficulties, the competing demands of different academic tasks (teaching and research, for instance), and personal versus professional responsibilities were also discussed. These are important considerations for CARTA fellows as all belong to faculties and remain employed in teaching positions, although, ideally with a lighter load. Many also have young families and so have multiple responsibilities.

Interest in the supervisors’ workshops has been high, with substantial participation for a voluntary programme (see Table 2 below). Two CARTA partner universities have supplemented these workshops with their own institutional events – Moi University, Kenya, and the College of Medicine, University of Ibadan, Nigeria, and workshops and support group meetings have been held regularly at the faculty level at the University of the Witwatersrand.

Table 2: Participation in CARTA supervisor workshops, by gender

Workshop Date	Male	Female	Total*
April 2011	10	4	14
December 2011	15	4	19
November 2012	14	7	21
March 2013	17	6	23
November 2014	14	12	26
November 2015	15	3	18
Overall	85	36	121

*Ten supervisors attended more than one workshop; hence overall attendance proportion for the period was $111/179=62\%$

Creating Space for Supervisor-Supervisee Interaction

From 2011-2013, with the first three cohorts of students, supervisors' workshops were conducted during both JAS 1 and JAS 2, so that facilitators interacted with supervisors from the commencement of the fellows' (supervisees') training. In the first year (March 2011), the supervision workshops were conducted during JAS 1 over two days, while fellows undertook independent work; supervisors were present when fellows presented their protocols as developed or expanded during the first three weeks of this initial JAS. The supervisory workshop provided opportunities for discussion around milestones, monitoring progress, and ways to resolve difficulties in supervision. In workshop evaluations and feedback sessions, supervisors openly spoke about their initial expectations, the workshop, opportunities for improvement, and areas for future reflections. Workshop facilitators (experienced supervisors) took notes of points raised during these sessions in order to inform adaptations over subsequent years. As a result of this feedback, at JAS 1 in 2012, the supervision workshops were conducted over three mornings while fellows were in other sessions. Consequently, supervisors were also able to participate together in the fellows' curriculum held in the afternoons, gaining the opportunity to engage with fellows' work, see their fellows in action presenting posters, and listening to the responses from other fellows and JAS faculty.

Supervisors and fellows regularly met and participated in focused "clinics" with CARTA facilitators about a fellow's potential research projects and the challenges of operationalising particular research questions. Such discussions sought to avoid conflicting approaches between those advocated by CARTA resource persons and the supervisors. By maximising opportunities at

JAS for exchanges of ideas about possible research questions, outcomes, epistemology and methods, we aimed to encourage respect for different standpoints and to support the idea of the doctoral project as evolving rather than fixed. This lesson was as important for supervisors as it was for the fellows since many were unfamiliar with the multiple methods and diverse approaches promoted at the JASs. From 2013 onwards, supervisors attended the second residential programme only (i.e. JAS 2), in order to ensure that by the time of the supervision workshops, all fellows had supervisors and that the two already had some experience of working together, including one inter-JAS tasks around writing the literature review and formulating the research question and objectives.

In providing fellows with comprehensive training, and encouraging critical engagement and questioning (Fonn *et al.* 2016), we were mindful of the potential for fellows to challenge the authority of supervisors. At the same time, we were careful to include aspects of supervision, like the personal and cognitive development necessary for day-to-day research work, as important for CARTA fellows. Supervisors did not always recognise the relevance of this, however, nor were all as comfortable providing this kind of support to those they supervised; their understanding of supervision often reflected their own experience as students when interactions were formal and limited to academic advice only. Comments made by fellows, drawing their own experience, indicated an over-emphasis on the gate-keeping and quality-control aspects of supervision. As a result, from November 2014 onwards, we placed greater emphasis on discussions with supervisor/supervisee pairs to build the relationship between the two. Informal interactions between supervisors, their own supervisees, and other fellows also provided opportunities for participants to reflect on supervisory relationships, expectations, processes and outcomes in a non-confrontational way and build a supportive community of research practice among those involved in each cohort (de Lange *et al.* 2011).

Specific Themes in Supervisors' Workshops

Within most universities, not only CARTA member institutions, there are limited formal opportunities for academic staff to meet and discuss problems of supervision, and for students and supervisors to seek mediation and support. We encouraged supervisors to talk about the challenges they faced in balancing their various time commitments and to reflect upon the place of time advising students. Additionally, we discussed co-supervision, since students might have more than one supervisor, sometimes from different disciplinary backgrounds and traditions, potentially with different

expectations, practices and styles of supervision (Lee 2012). In many cases, doctoral fellows enrol in CARTA member universities other than their own and have a local university co-supervisor as well as an enrolled university lead supervisor. Cross-institutional supervision has offered an important networking tool for fellows, supervisors and institutions. CARTA fosters different kinds of relationships between fellows and supervisors, which, in interviews fellows, was characterised as particularly collegial. Supervisors also described their relationships with fellows as ‘fantastic’ and ‘two-way’ and applauded the valuable opportunities for networking that cross-institutional co-supervising provides. ‘Focal point’ academics within the CARTA institutions also described CARTA’s cross-institutional supervision as a ‘unique experience of networking and support’.

Since fellows often aspire to produce scholarly publications as part of their work for their PhD (thesis by publication), time was also spent on different models of PhD theses (Louw and Muller 2014). This allowed for conversations among supervisors about the kinds of work worthy of a PhD. In the process, it became clear that most supervisors were comfortable with the skills component of PhD training, while at times they were uncomfortable with their students being more knowledgeable than them in some areas. They were more likely to be challenged by the multi-disciplinarity encouraged by the CARTA programme, the challenges around epistemological stances and recognition of multiple knowledges, and the broad professional competences and values that we expected of fellows.

Discussions around epistemology, methods and approaches to co-supervision fed into what we regard as the informal curriculum of CARTA supervisor training: one which challenged hierarchies and highlighted the importance of good supervision and mentorship in order to socialise CARTA fellows and other PhD students into an academic world of public health scholarship with an emphasis on social justice. The values and processes integral to CARTA training – interactive teaching methods, participant-centred learning, critical inquiry and scholarship, social accountability, engagement with policy-makers, and collaborations with civil society – were integral to these discussions. Since we expect our fellows, upon graduation, to advocate for such values, their supervisors needed to understand our approach, and hopefully support it. To promote this, we used andragogical (adult education) methods in the supervision workshops such as small group discussions and roundtables rather than formal lectures.

Facilitators also raised topics which some supervisors found difficult to address: sexual harassment; violence against a student on campus and/or in the field; plagiarism and tensions around intellectual property; and ethical

issues associated with where and how a student might conduct research (Titus and Ballou 2014). The workshops provided an important space to consider any personal experiences and to generate appropriate responses. While facilitating discussions about these interpersonal and personal challenges, facilitators emphasised that there were no easy ways to resolve these within doctoral programmes. Rather, facilitators hoped to illustrate that each supervisory relationship was a new, distinctive personal relationship, and that there were no simple ways to ensure that this would proceed smoothly. Facilitators were able to draw on their own experiences of supervision, to at least reassure participants, by example, that supervising was neither easy nor predictable. Also used was a film, 'The PhD Movie' (www.phdcomics.com/movie/, 2015), to illustrate typical problems in supervision and provide a neutral point of departure for discussion.

The Supervision Contract and Memoranda of Understanding

Mutual acknowledgement of tensions around supervision among fellows and supervisors at the first supervisory workshop in 2011 prompted workshop facilitators and participating supervisors to develop a draft agreement that would promote timely progress and appropriate performance, as advocated by other authors (Hockey 1996). The Contractual Agreement for PhD Studies (see supplementary file) distinguishes between the principles and actions that apply to the doctoral candidate, the supervisor(s), and agreements between the two. The CARTA supervision contract, as it has come to be called despite not being legally binding, sets out the mechanisms to support responsibility and communication, and elucidates processes to resolve any disagreements.

Points specifically for a doctoral candidate include adherence to university rules and regulations concerning enrolment, attendance on campus and at courses and seminars, the regular submission of written work (at a negotiated frequency), and ethical obligations. The contract states explicitly that the student has the right to intellectual, administrative, and practical support to undertake his or her research, holds ownership of his or her work, and is responsible for its content and presentation. The contract specifies that, through discussion, the supervisor and candidate will develop and agree on a work plan, modes of communication, timely feedback, the regularity and duration of meetings, technical and other support, and publication plans to ensure clear timelines, benchmarks and pathways to facilitate the smooth process of research and the completion and successful submission of the thesis. It includes clear statements of the obligation of the supervisor to guide and support the PhD candidate, including supplementary technical

training as required, assistance in relation to equipment and services, intellectual support and (if needed) counselling. It includes additional clauses relating to the authorship and publication of articles and other outputs (e.g. abstracts, posters).

The contract tacitly acknowledges difficulties in supervisory relationships and PhD programmes at given points – difficulty in undertaking the literature review, gaps in face-to-face advisory meetings, failure to keep pace with plans for analysis, and delays in submitting or returning comments on written work; these difficulties and possible resolutions are discussed during the supervision workshops. Since disagreements between supervisors and candidates tend to change over the duration of candidature (Gunnarsson *et al.* 2013), the contract needed to be a comprehensive resource. It, therefore, made explicit the right of the student to change supervisory arrangements for any reason, with the permission of the appropriate university representative, without penalty. The contract also sets out what a supervisor can expect from a supervisee, and that a supervisor has the right to take steps to withdraw from supervision or terminate candidature if the candidate fails to meet his or her contractual obligations. Although this summary implies an emphasis on penalties and control, the document has been welcomed, clarifying for both supervisor and candidate how they should work together in productive and positive relationships.

The contract was designed, among other things, to ensure the wellbeing of the PhD fellow and supervisor (Juniper *et al.* 2012), rather than simply focusing on progress and output. Fellows and supervisors sign this contract at the beginning of working together, with modifications as needed. Since the contract is used for CARTA fellows to govern supervisory relationships regardless of the university or research institute of employment of supervisors (and regardless of where the supervisor is located), it provides a clear and shared understanding of obligations, rights, responsibilities and opportunities to build an effective relationship between the two (Gill and Burnard 2008). On this basis, supervisors are able to build their capacity in supervision (Halse 2011; Calma 2007). Fellows have found the contract especially helpful, referring to it as a mechanism that they can use to ensure quality supervision. At the same time, from interviews, it emerged that some fellows have been disappointed, largely because CARTA, through the workshops, contracts, and rhetoric, had raised expectations of quality supervision, and they wanted greater engagement from supervisors than they received.

At the outset, some supervisors resisted the idea of a contract and resented CARTA's apparent intrusion into standard academic practices and institutional authority; they were adamant that they comply firstly with

the rules of their employing university. CARTA always acknowledged this priority. It cannot overrule the university in which the CARTA fellow is enrolled, and the university retains responsibility for quality control and is the final arbiter when there is conflict. CARTA, in the first year especially, was seen by at least some supervisors and fellows as comparable with other funding agencies, with roles limited to the payment of stipends and occasional other forms of financial assistance. Additionally, many supervisors had other students and they wished all students to follow the same processes, hence their resistance to CARTA requirements, including the contract. In the second year, we addressed these potential points of discord by encouraging fellows and proposed supervisors to discuss the contract together. Cohort 1 fellows noted its utility in their final JAS 4, both for their own supervision experience and their role as supervisors (Adedokun *et al.* 2014). Supervisors have reported, in discussion sessions and in evaluations, that they appreciated the emphasis on values and standards and felt proud to be held to account for quality standards in contrast to less well defined approaches that they felt prevailed otherwise. Acting as guidelines and statements of expectations, the contracts have come to be invaluable for enhancing understanding and respect between supervisors and fellows.

Hence, despite some initial concerns, the contract has been institutionalised within the CARTA programme and adopted by all nine universities, as indicated in annual CARTA reports to the secretariat. The latter often refer to the contract as a benefit of participation in CARTA that universities are applying with post-graduate students other than CARTA fellows.

Achievements

As reflected in the report of the review of CARTA (Christoplos *et al.* 2015), the perceived value of the supervision model stems from both its structure and from CARTA's networking opportunities. In terms of structure, the contract – an innovation for most participating universities – provides clear guidelines in terms of time, communication and inputs, and expected outputs. It kept fellows 'on track' and gave their supervisors a guideline of what to expect and revert to when they faced problems in terms of communication or process. According to fellows and supervisors, in interviews conducted for evaluation purposes and in informal discussions, it has facilitated greater mutual accountability between supervisors; at the same time, it has fostered collegiality. This has occurred despite some resistance from those supervisors who felt that the CARTA model was being imposed on them, and that it was an unnecessary instrument of surveillance, as noted above.

By December 2015, 33 fellows had graduated, 24 of whom remained in their own departments to continue their academic careers, four with CARTA re-entry grants to build their research careers. Nine graduates took up post-doctoral fellowships in other CARTA institutions prior to returning to their home departments. Over this period, only eight fellows (5%) left the programme for other fellowships or had been terminated for lack of progress. Thus, completion and re-integration into academic roles has occurred for most graduates. Although we cannot directly attribute these outputs to the quality of supervision, or the extent to which the different curricular components or supervision initiatives contributed to these successes, the literature cited above strongly suggests a relationship between good supervision and student retention and throughput. As CARTA encourages mobility within its participating institutions, some graduates may move to other institutions, potentially (positively) impacting the development of cultures of supervision at their home institutions but continuing to strengthen African scholarship (Adedokun *et al.* 2014). Given the perceived value of cross-institutional supervision, we might expect more joint, associate or collaborative supervision arrangements, with potential enrichment of supervision experiences and graduate success.

Limitations and Directions

The extended period of time that fellows and supervisors have spent with CARTA facilitators has enabled both groups to explore core CARTA values around scholarship, critical thinking, professional development and the ethics of academic practice, both in research and in practice, teaching settings, the institution and society as a whole. Although this enthusiasm gives cause for optimism, the replicability and sustainability of this central aspect of CARTA-led supervisory reforms are difficult to verify at this point, given the limited data available, and duration of CARTA as a programme. The approaches are valued, but it is recognised that they will need to be adjusted to local needs and conditions to be more widely applied, just as CARTA's training and support for supervision continues to be refined each year. While it seems plausible that these reforms will be adopted by current supportive supervisors and future supervisors (former fellows), this will be influenced by their ability to adapt the norms to their different universities and countries, in light of other reforms in supervision and doctoral education. How this model also influences ideas about scholarship among emerging scholars, their institutions and trainees, has yet to be examined in the sub-Saharan African context and elsewhere.

Implications for Policy and Practice

Nevertheless, some preliminary implications can be drawn from our experience. First and foremost, most supervisors and their fellows relished a chance for both formal, constructive engagement around challenges in doctoral supervision, and informal interaction in which to share experiences and generate helpful responses. Providing forums for such dialogue should be a priority of the more commonly appearing Post-Graduate Studies units in sub-Saharan African universities (Nerad 2011). Second, familiarization among all supervisors with guides and manuals on supervision and the use of contracts could facilitate more cognizance of promising practices among both supervisors and their supervisees. Third, closer tracking of supervision experiences among both supervisors and doctoral trainees at all institutions conducting doctoral training could provide helpful indicators of areas of success and those requiring more attention. Fourth, among a critical mass of supervisors at African institutions beyond those in South Africa, familiarity with the scholarly literature and explicit research on supervision, in keeping with the scholarship of teaching and learning field, could provide the needed research to inform indigenous styles and modes of doctoral supervision in Africa.

Notes

1. The African universities that belong to CARTA are: Makerere University, Uganda; Moi University, Kenya; National University of Rwanda; Obafemi Awolowo University, Nigeria; University of Dar es Salaam, Tanzania; University of Ibadan, Nigeria; University of Malawi; University of Nairobi, Kenya, and University of the Witwatersrand, South Africa; the four African research institutions are: African Population & Health Research Center (APHRC), South Africa; Agincourt Population and Health Unit, South Africa; Ifakara Health Institute (IHI), Tanzania, and KEMRI/Wellcome Trust Research Programme, Kenya. For further details, see Authors (2010).
2. We do not have data on number of supervisees per supervisor, over a career or at beginning of their involvement in CARTA, but at any time, there is a range of one to ten or more.
3. CARTA supervisors have been drawn from the following disciplines: Anthropology; Behavioural Sciences; Biochemistry; Clinical Epidemiology; Demography and Social Statistics; Entomology; Environmental Health; Epidemiology and Biostatistics; Health Policy Planning and Management; Geography; Immunology; Library, Archival and Information Studies; Mass Communication; Medical Anthropology; Microbiology; Mental Health; Molecular pathology; Nursing Science; Nutrition; Pediatrics and Child Health; Pharmacy and Pharmaceutical Chemistry; Political Science; Population Studies; Psychology; Public Health; Social Work; Sociology; Statistics; Zoology.

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