Comments: Development of an early career academic supervisor in Statistics - a discussion on a guiding rubric

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The issues raised in this paper will benefit from further and broader discussion across institutions in the country. The authors claim that there are several problems that persist in South Africa regarding the state of academic Statistics. One of these issues concern doctoral supervision by early career academic statisticians; specifically their lack of experience and the lack of available mentorship. The authors suggest using a guiding rubric, in addition to networking among early career doctoral supervisors, to address these problems.

We appreciate the fact that the focus of the paper is to address the challenges faced by current early career supervisors in Statistics. However, the ideal approach would be to prepare PhD students for certain aspects of supervision during their own PhD studies. It seems as if the authors suggest that there is a large cohort of young and/or aspiring academics in Statistics with a lacking continued relationship with their supervisors. It is envisaged that the supervisor and student relationship should develop into a collaborative one in which continuous mentorship can take place after the completion of the PhD degree. The current predicament, as stated by the authors, could be due to a lack of sustained mentorship and perhaps a detrimental experience of a previous supervision style. A memorandum of understanding will guide the initial relationship between the supervisor and the student. This relationship should be kept professional with structured weekly or fortnightly meetings, with a clear indication of what is expected from the student for the following meeting. These expectations should be put in writing to assure that there is no confusion about the expectations of both parties. Since the two parties work closely together on a regular basis, it is inevitable that from time-to-time the relationship

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between a supervisor and student will become more informal. In our opinion, this is a positive development, since both parties can benefit from learning and appreciating personal characteristics and qualities of each other.

Perhaps a bigger problem leading to the lack of experienced supervisors is that the focus of the priorities of academics has shifted towards teaching responsibilities due to increasing class sizes and more structured academic programmes. Additional to this, continuous renewal to existing curricula and the development of new material are required to include cutting edge content to meet the rapid changes in applied practices related to the growth of Data Science as a discipline. This results in less opportunity for academics to focus on research and gain research experience, while in the past academics may have had more research capacity.

Motivation is lacking why the authors deem the situation to be different for young academics in Statistics compared to other disciplines. A possible reason for the difference between Statistics and other science disciplines, is that research in Statistics is commonly conducted independently and not in larger research groups with ongoing projects, which could ease collaboration and create opportunity for co-supervision. [3] evaluated the co-authorship behaviour of researchers in Chemistry and Statistics, which exposed that the network sizes of Statistics groups are smaller and that more single author papers are published. Additional to this, Statistics as a discipline, has probably changed at a much more rapid pace in the past decades compared to other disciplines, due to the explosion of data. Perhaps the problem is therefore also that the so-called impostor syndrome is especially severe in Statistics, which results in inexperienced supervisors lacking confidence.

We agree that a collaborative initiative across universities could be beneficial to discuss the possible obstacles. It is possible that there exists an imbalance in the level of experience at certain institutions, which could contribute to the disproportionate allocation of work within an academic department. A collaborative programme could aid in bridging this gap and result in an overall strengthened discipline. Such an endeavour will require the commitment from various stakeholders and will especially rely on the willingness and capacity of senior academics to share expertise.

The crisis in academic Statistics cannot simply be ascribed to the fact that there are not enough experienced supervisors available. The origin of the crisis is the increasing popularity of Statistics and Data Science. The authors refer to the study in [1], claiming that the opportunities for statisticians in industry have not yet been fully recognised. We are of the opinion that this is no longer the case. This means that as student numbers in Statistics started increasing dramatically, and the pipeline of potential PhD students therefore increased, industry became a huge drawcard. This in turn could be the reason that universities do not have enough mid-career academic statisticians, since many of them are in industry. In fact, many Statistics departments in South Africa struggle to fill academic positions, and the pool of talent from which these positions can be filled is limited and does not seem to be increasing. Perhaps, as the authors identified, the pull of industry, coupled with the pressures experienced by many academic statisticians, means that academia cannot realistically compete with industry. Therefore, while the number of honours and masters students have been on an upward trajectory for a number of years

now, it is becoming increasingly difficult to attract these students for doctoral studies.

The crisis in Statistics could therefore also be ascribed to a lack of suitable and committed doctoral candidates, rather than solely a lack of supervisory capacity. In order to attract students and remain relevant, academic statisticians could engage industry in co-supervision roles. An increasing number of doctoral graduates in Statistics are working in industry, as already mentioned. Co-supervision between applied statisticians from industry and academic statisticians could ease the capacity constraints in academia and simultaneously ensure relevance of research, which will also benefit the PhD students; see [7].

We are not convinced that a guideline document (i.e. rubric) will address the posed issues. However, procedural and administrative tasks associated with a PhD degree could be sensibly summarised in a rubric. As examples, selecting appropriate research topics and identifying study objectives to ensure sufficient scope for a PhD project are especially challenging for the young academic without sufficient mentorship. The required novelty of a PhD project is paramount and could be a daunting aspect for a young supervisor, as could understanding the role of the supervisor and setting boundaries to ensure that the balance of guidance and assistance during the project is maintained. Early career supervisors might therefore quickly adopt the co-writer style of supervision to attempt to secure a successful outcome; see [2].

Ideally, early career supervisors should gain experience in the supervision of masters projects before embarking on the co-supervision of a PhD degree. In addition, the study by [6] shows that one of the main reasons for choosing a doctoral programme is the relationship with the academic supervisor, perhaps further emphasising the importance of focusing on successful masters supervision as a precursor to fostering successful doctoral supervision. Although the current topic of discussion is aimed at PhD degrees, it could be beneficial to take a step back and consider the institutional alignment and standardisation on masters level. Grasping the diverse expectations between institutions on required outcomes on postgraduate level could benefit all parties involved. The authors do not distinguish between masters and PhD supervision; sometimes they refer to postgraduate supervision in general, but overall, their focus seems to be on doctoral supervision. In our opinion, the initial supervision focus of early career academics should be on masters level. Experience gained in this way will assist in the eventual supervision of PhD research. A rubric might be more useful at a masters level, where it is easier to standardise outcomes. In a PhD study, the aim should be independent research and the only overarching question should be whether a student makes a new contribution to his or her field of study. Using a rubric in this regard may be detrimental to the overall envisaged outcome of the PhD study. While it is understood that the proposed rubric would be aimed to guide the supervisor on the PhD process, one should be cautious to not think of it as a 'template' of fixed guidelines for the PhD student. This was also echoed by [7]: one should be wary of reducing doctoral education to a generic checklist.

Any PhD thesis, even in the Statistical Sciences, contains elements of creativity and imagination. A PhD thesis, in a certain sense, encloses the identity of the student who wrote it. The student has a choice to decide on, for example, the layout, the ordering of chapters and the presentation of results in the thesis. By confining a

student to follow a restricted checklist rubric approach, it suppresses these elements of creativity and imagination. [8] states that a holistic approach could cultivate a more successful PhD candidate. This approach would include exposure to teaching and serving on university committees, attending conferences and publishing research papers. [4] specifically compares Sweden and South Africa in terms of the role of doctoral education in early career development. They find that a traditional research-based doctorate does not adequately prepare early career academics for the multiple responsibilities and demands they will face in academia. To ensure that the problems currently experienced are not perpetuated, careful consideration should be given to what guidance is given to current doctoral students in Statistics.

In terms of standardising PhD assessment, a rubric is not deemed necessary, given that a mark does not have to be awarded. Subjectivity in PhD assessment has always been a concern and is also not unique to the field of Statistics. Trying to standardise this using a rubric is not the solution. As an alternative to a rubric, in order to obtain standardised assessment results, we suggest that a letter, written by the supervisor, accompany the thesis when it is sent for examination. Such an accompanying letter may consider the following points:

1. A description of the PhD degree and the number of the credits of the thesis; the nature of thesis in terms of theory, application, novel application or a mixture between theory and application.
2. A description of the area of research and title of the thesis and whether the title was proposed by the supervisor or the student.
3. The aim of the research from the supervisor's point of view, including aspects that should have been covered (and were not), or additional aspects that were covered and not expected to be covered.
4. The origin of the data: whether the data were simulated or readily available. Also, was ethical clearance needed and obtained for the data and whether data cleaning was a significant aspect of preparing the data before analysing it.
5. The student's work ethic and his or her ability to work and write computer code independently.
6. The significance or contribution of the research that was done.

Another possibility, in the spirit of aligning PhD programmes in the country, is to consider structured programmes in the form of compulsory course work or periods of practical experience without reducing the importance of the thesis. This echoes the early ideas of [5] for the modernisation of PhD degrees in Statistics, which evidently is a continuous process.

Although the current capacity problems in academic statistics cannot be denied, there are currently initiatives already in place which may assist in alleviating some of the issues experienced. For instance, to our knowledge, several of the challenges that have been listed by the authors are objectives of the Pathways to a Successful Academic Career Programme (PSACP) of the National Graduate Academy for Mathematical and Statistical Sciences (NGA(MaSS)) that was launched in January 2020. The first cohort of fellows have completed the programme at the end of 2021 and the impact will be evident in the coming years. The programme aims at providing support and training to

early career academics on the diverse aspects of becoming a well-rounded academic. A short course aimed at novice PhD supervisors in the African context is presented annually at Stellenbosch University through the Centre for Research on Evaluation, Science and Technology (CREST). Experience can be drawn from existing programmes to facilitate the proposed network.

In addition, the authors refer to a paper in Nature[1] which discusses networking between early career academics. In this paper, mention is made of an initiative AuthorAID, which is a global network aimed at providing support and mentoring to researchers specifically in low- and middle-income countries. While this is a global network across disciplines, a similar initiative on a more local and subject-specific scale could be considered in the South African Statistics community. A clear concern identified by the authors is the lack of mentorship, and we acknowledge that at many universities in South Africa, early career academics in Statistics may not have mentors to guide them. However, there are currently still many experienced statisticians in South Africa who are either recently retired or close to retirement, some of whom would, in all likelihood, be very willing to provide mentorship. Perhaps leveraging their experience and expertise should be the main focus of efforts to address the identified issues, instead of a rubric. Setting up a network of mentors and mentees and organising workshops and linking up statisticians across the country could be much more beneficial to early career academics in developing their doctoral supervision skills, rather than a rubric. As discussed before, an important part of gaining the requisite experience to provide supervision at doctoral level, is the supervision of masters students. We are therefore of the opinion that a rubric might be more useful at this level.

Furthermore, we recommend that further research is undertaken to gain a clearer understanding of the current situation at Statistics departments at universities across South Africa. Such a study should aim to quantify at least the following:

1. Is there currently a problem with supervisory capacity in Statistics in South Africa, or is there a shortage of PhD students? A lack of PhD students means that early career academics do not get the opportunity to gain experience in supervision.
2. What has the impact of the growing popularity of Statistics and Data Science been on the capacity in academic Statistics and how does this compare to the international situation currently?
3. A qualitative component of such a study could consist of interviewing the senior academic statisticians in South Africa and understanding how they gained their experience in terms of postgraduate supervision.

In conclusion, there are clear concerns regarding the state of academic Statistics in South Africa, and the authors should be commended for their efforts in addressing it. They list several issues facing the discipline, and overall their main identified concern appears to be the lack of mentorship available to early career academic statisticians. While this might well be a serious issue, we are of the opinion that the use of a guiding rubric is not going to assist in solving this problem. Instead, we recommend focusing on the standardisation of supervision and assessment procedures across masters programmes and leveraging the skills of senior academic statistics through a formalised network. In consideration of

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[1]https://www.nature.com/articles/d41586-020-02159-x

the PhD thesis more freedom should be allowed to develop the academic identity of the individual and structured solutions, such as a rubric approach, is not envisaged to solve the posed issue.

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