

Doctoral writing for publication at a leading African university: Publication patterns and pedagogies

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Writing-for-publication is a practice that doctoral students should acquire for integration into international research culture. Publication rates and forms of pedagogy supporting the development of publication skills for doctoral students, however, remain inadequate worldwide. Limited data of doctoral student publication from African universities is available in terms of publication patterns and pedagogies. To gain insight into publication pedagogies, a top-publishing science department at a leading African university was studied. A literature search was performed to find journal articles linked to dissertations and the numbers and timing of publication were documented. Supervisors and graduates from the sample were interviewed to uncover educational strategies employed to support doctoral student publication. Results indicate that the majority of the students published. Departmental culture and a pedagogy of collaboration were highlighted as aspects encouraging students to publish. These results indicate that, with appropriate educational strategies, PhD students can be prolific publishers and thereby become integrated into research cultures.

Keywords: doctoral publication, publication pedagogy, collaborative practice

Introduction

Peer-reviewed journal publication is synonymous with academic success and is, to date, the most trusted and unbiased way of disseminating new knowledge to the research community. Tertiary institutions value the publication of papers in quality journals, because it constitutes a measure of their international ranking and a source of income in the form of government subsidies (McGrail, Rickard, & Jones, 2006). Hence, institutions encourage their academic staff to publish, by offering merit

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awards and promotion. Moreover, a sound publication record frequently translates directly into research funding and career progression (McGrail et al., 2006).

Publishing is important not only for academic staff, however, but also for postgraduate students. The skills that students acquire and practise when publishing their work in peer-reviewed journals include organising text effectively, command of sophisticated scholarly register and discipline-specific language (Hyland, 1999), argumentation, coherence, abstracting, choosing the correct target audience (i.e., journal), and managing the publication process (Kwan, 2010). Having a publication record and the skills acquired in the process of building such a record will benefit a postgraduate student when applying for a scholarship, a PhD, a post-doctoral position or a job in academia in a highly competitive environment. If the traditional PhD-by-dissertation route is followed, publication before graduation can also be beneficial, as students can use the feedback obtained through the publication review process to inform their final dissertation write-up (Gottlieb, 1994).

Despite these obvious advantages of publishing, publication outputs (and forms of pedagogy supporting the development of publication skills) are still inadequate for postgraduate students. Lee and Kamler (2008: 512) describe the “lack of widespread and systematic publishing of doctoral research [as] a significant problem in the effectiveness of doctoral education”. Several studies have confirmed this problem of inadequate preparation for publication among postgraduate students (for example, Frković, Skender, Dočjinović & Bilić-Zulle, 2003; Younes, Deheinzelin & Birolini, 2005). Aitchison and Lee (2006: 266) focus the problem on the “absence of a systematic pedagogy for writing”.

Fortunately, ways have been suggested to address the problem outlined above. Reports on pedagogies supporting research writing include co-authorship under supervisor guidance (Dinham & Scott, 2001; Kamler, 2008), writing groups (Cuthbert & Spark, 2008; Lee & Kamler, 2008; Aitchison, 2009) and writing courses (McGrail et al., 2006). Much of the work done in the area of publication pedagogy is situated in the humanities and social sciences. In the sciences, at least one of these pedagogies, co-authorship under supervisor guidance, is regarded as a “taken-for-granted practice” (Kamler, 2008: 292); besides that, hardly anything is reported for science disciplines. Given the importance of publication in establishing an academic career and the relative scarcity of research in the area of publication pedagogy, there is a pressing need for studies investigating the actual publication rates of doctoral students and identifying publication pedagogies employed in different disciplines and research settings. This type of investigation is particularly important in a country such as South Africa where the need for developing a new cadre of academics to sustain and increase current levels of knowledge production is frequently expressed (see, for instance, Department of Higher Education and Training, 2012).

At this point, there are no reports of doctoral student publication rates in African universities. This study sets out to investigate doctoral publishing at one African

university that is renowned for its research productivity. It particularly describes the publication profile of doctoral graduates at a top-publishing science department and attempts to highlight some of the educational strategies that can be positively correlated with successful doctoral student publication. This paper aims to report the numbers and timing of publications by a group of doctoral graduates, and to establish a set of best practices that seem to encourage writing-for-publication in this group.

Methodology

Sample selection

In order to start exploring the publication profiles of doctoral students, purposive nonprobability sampling was employed in that observations were selected based on certain characteristics (Sugimoto & Cronin, 2012). Zoology is among the ten most published subject areas countrywide in South Africa (Kahn, 2011). A department dedicated to this discipline, at a research-led South African university, was selected as representative of an outstanding department in terms of publications. The institution is the top-publishing institution in South Africa and, within the Science Faculty, this particular department has remained the one responsible for the most publications per year over the past decade.

Demographics

To gain demographic information on the sample, the list of graduate names was submitted to the institutional planning department, which keeps records of all students at the institution, past and present. Information on age, gender, first language and year of graduation was collected. To account for possible name changes of women who get married and change their last name, a list of the women in the sample was checked against the institution's alumni database, which keeps an updated record of past graduates.

Bibliometric analysis

A bibliometric analysis was performed on a sample of doctoral dissertations. As all completed dissertations are kept in the institution's library, a complete list of dissertations from the department in the 'ISI ResearchSoft Tagged Output Format' was copied from the library's online ALEPH catalogue into Microsoft Excel. From these, a subset of dissertations submitted between 1990 and 2010 was created. The lower boundary of the subset was selected to coincide with the arrival of electronic journals worldwide when a different publishing environment emerged with the advent of the internet (Okerson, 2000). The upper boundary was set to allow the inclusion of post-PhD publications of authors who graduated in 2010.

The period of publication for each graduate was limited to 11 years: six years prior to graduation (research-in-progress period) and five years after graduation (post-doctoral period). Since doctoral students in the Science Faculty at this institution take,

on average, slightly longer than five years to complete a doctoral degree (from data spanning 2007-2012), the six years prior to graduation should allow for publications that may appear in the first year of registration. The five-year post-doctoral period of publication is based on the assumption that this is a productive time for producing publications based on dissertation research (Anwar, 2004).

To find journal articles related to each doctoral dissertation topic and by the same author, the Thomson Reuters Web of Science academic citation indexing and search service was used. This database is a reliable one for bibliometric analysis and allows for straightforward queries (Kahn, 2011). To ensure that no articles were missed, the online databases ScienceDirect and GoogleScholar were also searched. In each of these databases, a comprehensive search was performed using the surname and initials of the author as search terms in the 'Author' field. In the event where it was not immediately evident that the titles returned were related to the concerned dissertation, author affiliation was taken into account, by entering 'South Africa' into the 'address' (for Web of Science) 'affiliation' (for ScienceDirect) or 'with the exact phrase' (for GoogleScholar) fields. If it was still not evident if a publication was related to the same topic as the dissertation, the paper's abstract was read. Only articles published in journals were counted. Each article's title, authors, year of publication and journal name, volume and page numbers were recorded. Where a name change could be identified (this was the case for six female students), publications under the new surname were added to publications under the maiden surname.

Statistics

Descriptive statistics were generated on both graduation data (numbers and demographics) and publication data. For the latter, the participation rate (defined by Lee (2000) as the percentage of the sample with at least one publication), the number of publications per graduate, the timing of publication relative to graduation, and the relationships between the number of publications, gender and age of the most prolific publishers were described. All data were collected and descriptive statistics done using Microsoft Excel 2010.

Interviews

The bibliometric analysis was followed by semi-structured interviews with PhD graduates included in the bibliometric analysis as well as experienced supervisors from the department, in order to gain insight into some of the educational strategies that could contribute to publication productivity.

Results and discussion

Demographics

Over the two decades 1990 to 2010, a total of 119 PhD students graduated from the department, of whom 43.7% were female and 56.3% were male (1:1.3). This

ratio is closer to 1:1 than the ratio reported nationally for graduates in the natural sciences across South Africa (1:1.8; female:male) (Academy of Science of South Africa, 2010). The average age at graduation for the sample was 34.8 years. This is on par with the nationwide mean age-at-graduation for doctoral students in the natural and agricultural sciences, which is 34.7 (Academy of Science of South Africa, 2010). Age-at-graduation distribution indicated that the largest proportion (43%) of female students were in the age range 26-30, whereas the largest proportion (33%) of male students were in the higher age range of 31-35 upon graduation.

Number and timing of publications

Of all the graduates in the sample, 111 (93.3%) produced at least one publication related to their dissertations. This participation rate compares favourably with that reported in other studies. Roughly half of the doctoral graduates from medical faculties in Brazil (Younes et al., 2005) and Croatia (Frković et al., 2003) have not published anything after completing their dissertations. A study reporting on molecular biology PhD graduates states that only 32% of the sample, which have been busy with their PhD for three years on average, published (Brown, 2005). However, it is important to remember that the purposive sampling used in this study probably skews the results towards PhD graduate publication trends that are more productive than the norm.

Of those who published, only slightly more papers (57.3%) were published during the postdoctoral period than during the research-in-progress period (42.7%), indicating that the majority of the doctoral graduates started publishing well before completing their PhDs. This is not in line with the observations of Younes et al., (2005) and Figueredo, Sánchez Perales, Villalonga & Castillo (2002), namely that doctoral graduates only start publishing after graduation.

The average number of publications per student was 11.88. Even within such a productive sample of graduates, there are still trends indicating more or less publication productivity related to timing of publication and the demographics of the group. Forty-seven students (39.5% of the sample) published more than the average of 11.88 papers (Figure 1). Together, these 47 graduates accounted for 75.3% of all publications in the sample. For this study, these students are regarded as prolific publishers.

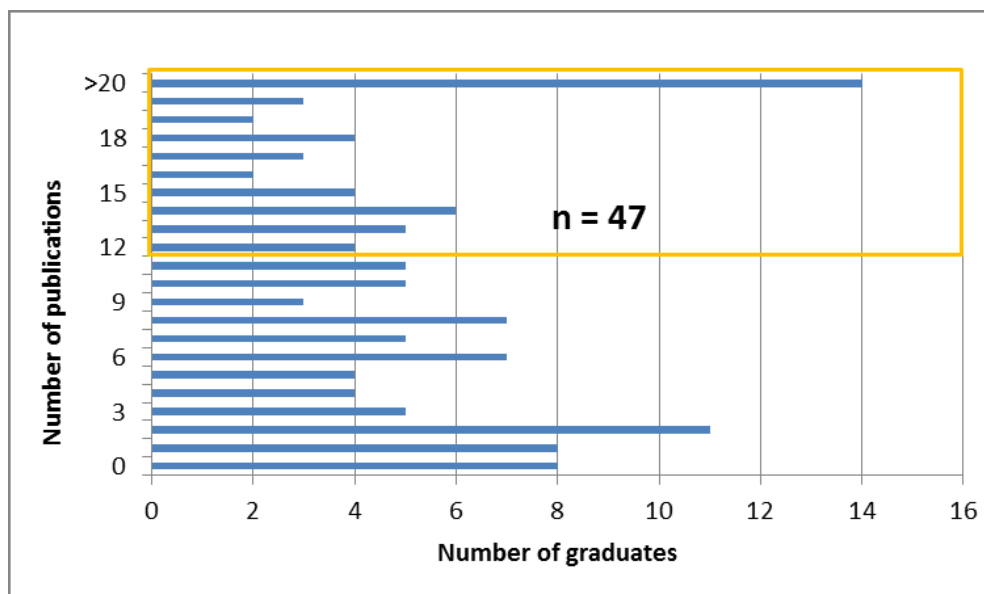


Figure 1: Number of publications by 119 PhD graduates with prolific publishers in the boxed area

The gender division of these prolific publishers shows that the minority (23.4%) were female, with 76.6% male. Male students thus outnumber female students by more than three to one (exactly 3.3:1). In order to establish whether there were differences in publication trends between the top-publishing male and female graduates and whether gender can be used as a predictor of publication success, the top five publishing graduates from each gender group were selected. Consistent with the trend observed in all graduates together, nine of these top ten had already started publishing five years before graduating. Male graduates had a higher total number of publications (271) across the 11 years than female graduates (158 publications). The top five male publishers have in common that slightly more of their publications appeared in the five years preceding graduation than for the postdoctoral period. For most of them (four out of five), there was not one year in the period recorded that they ceased producing papers (Figure 2).

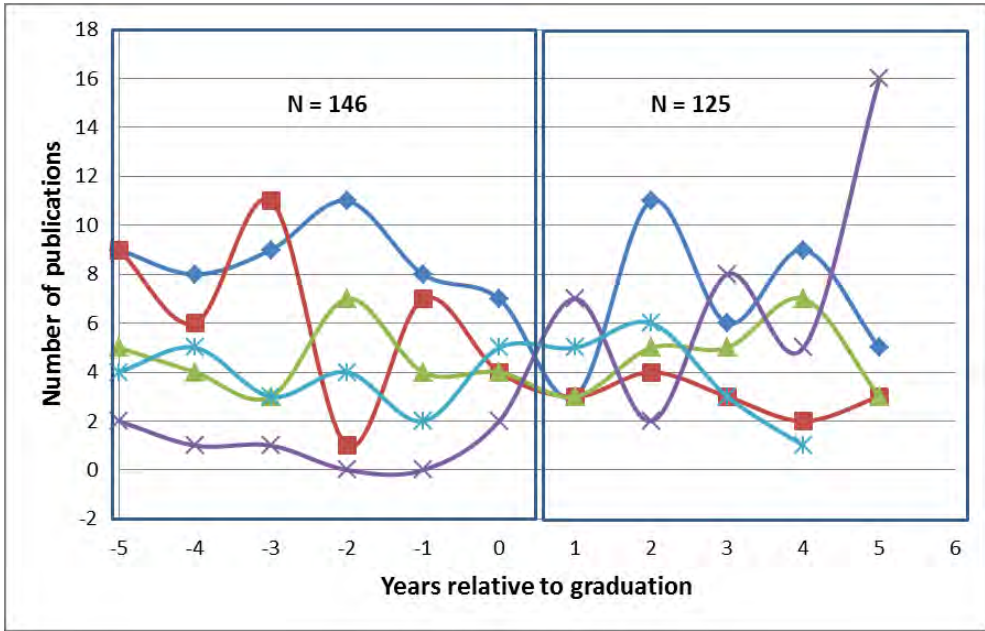


Figure 2: Top five male publishers and timing of their publications relative to graduation. One individual graduated in 2010; thus, a complete publication record of 5 years post-graduation is not yet available.

The top five female publishers, on the other hand, all had a number of years (ranging between one and six) during which they produced no publications (Figure 3). In addition, they all published more during the postdoctoral period than during the research-in-progress period.

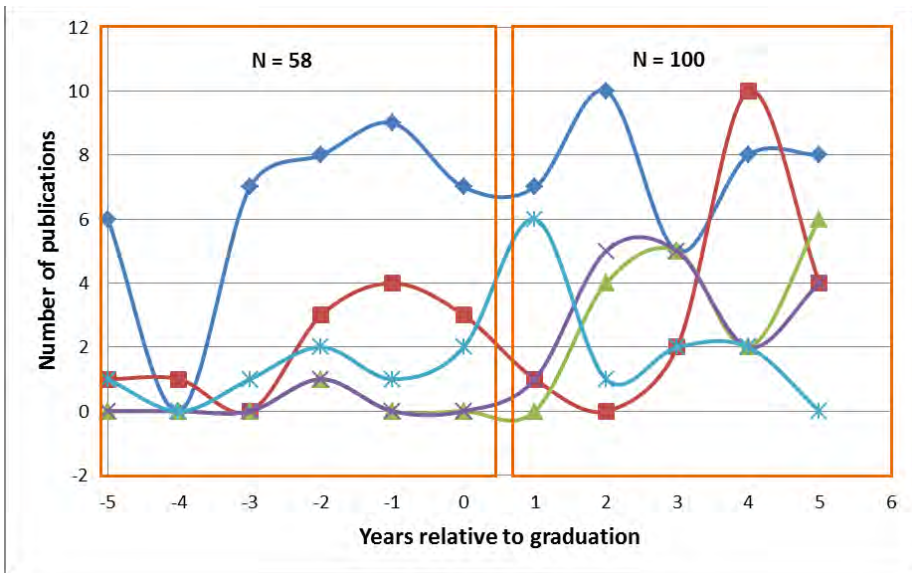


Figure 3: Top five female publishers and timing of their publications relative to graduation

While it is difficult to tie these observations to specific causes, it can be deduced that gender had an influence on publication productivity for these top-publishing graduates, with male graduates publishing more in total and more in the research-in-progress period than female graduates. This observation extends to the prolific publishers cohort, where 15 graduates published more during the research-in-progress period. Fourteen of the 15 are male graduates. A possible explanation for this that transpired from the interviews is that a significant intake of PhDs in this department are employed by industry, government or research centres and that these employees often register for a PhD after they have worked and published on a project, as part of their job, for several years. A larger proportion of these 'professional PhDs' are men.

Interview data

The interviews provided more insight into factors contributing to publication productivity. I shall focus on two aspects, which I believe are specific of the department studied: departmental culture and the discipline, and a pedagogy of collaboration. SV depicts a supervisor and ST a PhD graduate interviewee. Three supervisors and three graduates were interviewed. All three graduates were from the 'prolific publishers' cohort, and two of the three, one male and one female, were from the top five male and female cohorts.

Departmental culture and discipline

The department seems to have a particularly pro-publishing culture, which is reflected in it being the top-publishing department at the institution's Science Faculty for the past ten years. In 2003, a former head of department published a personal memoir of the centennial history of the department. According to his records, a focus on publication already started in the early 1900s which, through the years, led to the department becoming one "noted for its research excellence and productivity" (Brown, 2003: 31). He mentions the collegiality and increasing frequency of co-authorship between students and academics in the department.

From the three supervisors and one of the students interviewed, it was evident that this departmental culture contributes to the publication success of its PhD students. The supervisors described the department as having "an ethic of productivity" (SV1), and "maintaining a culture of publication" (SV3). There is an "expectation that you're able to present your work in some way to a broader audience" (SV2), so students are encouraged to attend conferences, from which a publication might ensue. There is an understanding in the department that "if a MSc or PhD project ... isn't published [it is considered] as basically a failure" (SV1). The student experienced it as follows:

I found ... this knowledge almost walking through the passageways, you almost like sucked it in, you could almost feel it. And there was such an attitude amongst students and staff about striving for the best. Everyone around me was aiming

to publish; there's no such thing as doing work without publishing it, that is the aim and that just became the most natural thing (ST1).

Another reason for the productivity in this department is that the discipline lends itself to numerous publications because of local relevance. While more generic science disciplines such as physics or statistics require novelty at a global scale for a paper to be accepted for publication, others such as the biological and environmental sciences can draw on local biodiversity to produce novel research (SV2). "You just have to observe something for long enough and it turns out to be papers that you can write" (SV3). The university is situated in one of 18 biodiversity hotspots in the world, the Cape Floristic Region. It has even been called the "world's hottest hotspot" (International Union for Conservation of Nature, 2012). The department is thus perfectly positioned to conduct novel research on local species, interactions and ecosystems. In that sense, it would not be fair to compare this department's publication output with that of other disciplines. It does, however, afford ample opportunity for students to practise writing for publication, as there is no shortage of new knowledge to disseminate.

Pedagogy of collaboration

The interviews brought to the fore that collaboration is central to publication productivity in this department. Collaborative learning theory states that learning is a socially constructed activity that takes place through communication with peers. It has long been acknowledged as a pedagogical tool for teaching writing, as writing can be deemed as essentially the ability to participate in a conversation. When students work collaboratively on writing, they are practising the discourse of the academic community they are entering (Bruffee, 1984).

The pedagogy of collaboration is active on three levels in this department: between student and supervisor, in writing groups, and in larger departmental seminar spaces.

Student and supervisor

The one supervisor made a strong case that "the key thing in productivity is actually the personal relationship between student and supervisor" (SV3), and that this relationship is forged in a framework of encouragement. "For me there's only one orientation towards students and that's to be encouraging" (SV3). Another supervisor described this relationship as "a collegial partnership in which you are both responsible for the product" (SV1) and that it is critically important for him that students publish and that his name appears on those papers. The third supervisor confirmed this by saying that publication productivity "is very much the motivation of the supervisors. [The students] are doing projects that are really close to the supervisor's heart and the supervisor wants to see those published" (SV2).

In order to see papers published, the structure of the dissertation would be planned around the papers that will come from it from the outset (SV1 and SV3).

This resonates with the PhD-by-publication approach, which has been suggested to prepare doctoral students more effectively for an academic career (Larivière, Zuccala & Archambault, 2008).

One student appreciated the role her supervisors played in enculturating her into writing for publication. She acknowledges that her supervisors built her confidence and taught her specific skills about writing papers. Among these skills were the “idea of writing as you go” and that she should not “expect it to be perfect first time around” (ST1). Another student also remarked that her supervisors “... encouraged [her] to publish a lot, because they all published a lot and so it was just kind of automatic” (ST2).

The practice of co-authorship in science has been described as “a crucial part of learning the ropes of academic publishing” (Kamler, 2008: 288). The degree to which a supervisor purposefully inducts a student into the process of writing for publication varies. For getting students to write papers, one supervisor tells her students to “... go ahead and publish!” (SV2), whereafter they are practically left on their own to come up with a first draft.

Other supervisors follow an apprenticeship model, where the student is supported throughout the process. For example, SV 1 “[tries] and give [his] students a whole lot of help”. In terms of writing, he often does “a tremendous amount of re-writing of the project” and considers it good training. He finds it satisfying to edit the work, talk to students about the changes made and then “by the time the last chapter comes it’s actually really good” (SV1).

The framework of encouragement mentioned earlier is demonstrated by how SV3 guides his students in developing their writing:

I’m happy to see papers that are really really desperately incomplete. I’d rather be given the opportunity to look at each section as you write it and I promise you I’ll not think worse of you because it’s sort of scrappy incomplete work. The important thing is to know that you’re going in the right direction (SV3).

Unlike SV2, he does not rewrite sections of the manuscript. “It’s the student’s work, and as far as possible it’s the student’s words” (SV3). He rather focuses on building the students’ confidence such that they become better writers. He provides them with a handout of guidelines on how to write well and keeps an open-door policy for providing encouraging feedback on writing. He also encourages his students to communicate their research to wider audiences by engaging in public science communication, opportunities which he describes as “a huge confidence builder” (SV3).

The strategies followed by these two supervisors are similar to what Gee (1989) calls the apprenticeship model. Newcomers (students) become members of a disciplinary community through apprenticeship into social practices (writing for publication), through scaffolded and supported interaction with people who have

already mastered the Discourse (supervisors). Discourse refers to “saying (writing)-doing-being-valuing-believing combinations” (Gee, 1989: 6).

Writing groups

Acquiring a Discourse is not only a product of the relationship between two individuals (in this instance, the supervisor and the student), but extends to being a member of a socializing group (Gee, 1989). As Aitchison (2010) indeed stresses, group-writing is a pedagogy that realises writing as a social practice. In this section, I shall highlight instances from the interviews where writing groups supported students' enculturation into writing for publication.

One supervisor promoted group-writing as follows: “I tell my PhD students that you don't have to do this [writing a paper] alone. We're a team doing it” (SV3). He referred to the postdoctoral fellows and other students in his laboratory as part of this team and would always encourage students to engage in peer-reviewing each other's writing.

One student remarked that some of his research projects were collective efforts, “from fieldwork to write-up” and that his publications reflect that, in terms of co-authorship (ST3). Another student elaborated on how a collaborative laboratory environment enhanced her writing and publishing experience:

The students around me were happy to read ... each other's work ... we had enough of knowledge and an interest in each other's work to understand what was happening in the paper. ... we would sometimes work it through each other first and then it would go to the supervisor. And sometimes it would just be on sections. Ja, we learned nicely from each other (ST1).

This is an example of how writing groups often emerge organically in the sciences, where students work together in laboratories and research groups and co-authorship is common. This is in contrast to the humanities and social sciences, where an individualistic writing and publication culture prevails (Cuthbert & Spark, 2008).

Some of the same benefits, as highlighted by Cuthbert and Spark (2008), that come with structured writing groups in an Arts Faculty, probably also feature in these 'organic' writing groups in the sciences, as demonstrated earlier: a sense of support and community, writing for an audience beyond the closed supervisor-student relationship, and improving your own writing through critiquing others. Peer interaction in such groups affords participants the opportunity to “test and extend their conceptual knowledge as well as their capacity to communicate this knowledge through writing” (Aitchison, 2010: 87) and, with supervisor guidance, it helps students “learn to write in ways associated with academic expertise” (Leverenz, 2001: 58).

Departmental seminars

During the interviews, another collaborative practice, reaching beyond the research group or laboratory, was illuminated.

For at least a decade, the department has hosted weekly seminars, called 'chatties', for postgraduate students to exchange ideas related to their research projects with staff and fellow students. Besides the advice the student gets, this is a learning opportunity for all students present. "They've gotten very good at dissecting the other students' projects, and of course then they don't make those mistakes themselves. So it's a tremendous training" (SV1). One student confirmed this:

[The chatties] were really useful for experimental designs ... you would get input from people who are not necessarily directly in your line but they have a different approach or a different background and then they would really strengthen the design which would come through in the thesis and then into the papers (ST1).

These are valuable pedagogical spaces where students are inducted into communicating and interrogating their research and into the central scientific practice of peer-review. Peer review can greatly enhance content and rhetoric and give students a feeling of group cohesion (Hansen & Liu, 2005). As emphasised by Lundstrom and Baker (2009), it is not only the one who receives comments, but also the act of giving peer review that impacts greatly on students' writing ability. 'Chatties' is thus a learning opportunity for the presenter and the participants and offers a further example of "social engagement in intellectual pursuits" (Bruffee, 1984: 652) employed by this department.

Conclusion

The combination of quantitative and qualitative data used here allowed for an in-depth look at patterns of doctoral student publication and educational strategies supporting students to publish productively. Gender- and age-wise, the cohort examined in this instance is on par with the nationwide profile of a doctoral student. The results in terms of publication output for this sample are, however, above average, as the institution and department were specifically selected to reflect research and publication excellence.

The department can be described as one that is successful in preparing its students to participate in research cultures, and in equipping them with the necessary publication skills for a career in academia. The key factors contributing to this success include a pro-publication culture and a pedagogy of collaboration which extends beyond the supervisor-student relationship to writing groups, within laboratories and at the departmental level. There are thus numerous opportunities for students to engage in critical discussion of their research and writing.

Writing for publication is an essential skill that should be learned and practised en route to a successful academic career. In South Africa, the necessity of preparing postgraduate students to write for publication is fortunately acknowledged. The South African Young Academy of Science recommends that offering writing-for-publication courses to postgraduate students and postdoctoral fellows should be a priority (South African Young Academy of Science, 2013).

Lee and Kamler (2008), however, argue that there is a need to move beyond ad hoc and unsustainable approaches such as workshops and courses, to support doctoral writing for publication. They highlight the importance of a systematic publication pedagogy, for instance, through building expert-mediated peer review processes and extensive supervision guidance into writing for publication. Aitchison, Kamler and Lee (2010) also highlight the importance of pedagogical practices based on 'writing together', for example in writing groups, to support doctoral writing for publication.

The findings of this study are in agreement with this and show how pedagogies that have proved themselves effective in humanities, social science and multidisciplinary communities are also effective in the biological sciences. In fact, the laboratory culture lends itself excellently to this kind of collaborative activity. The pedagogy of collaboration described here can serve as example to other science (and wider) departments in providing adequate support for their postgraduate students when learning to write for publication.

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