Enhancing Learning for Research Higher Degree Students

Jenny Hall, Alison Jaquet

Abstract—Universities' push toward the production of high quality research is not limited to academic staff and experienced researchers. In this environment of research rich agendas, Higher Degree Research (HDR) students are increasingly expected to engage in the publishing of good quality papers in high impact journals. IFN001: Advanced Information Research Skills (AIRS) is a credit bearing mandatory coursework requirement for Queensland University of Technology (QUT) doctorates. Since its inception in 1989, this unique blended learning program has provided the foundations for new researchers to produce original and innovative research. AIRS was redeveloped in 2012, and has now been evaluated with reference to the university's strategic research priorities. Our research is the first comprehensive evaluation of the program from the learner perspective. We measured whether the program develops essential transferrable skills and graduate capabilities to ensure best practice in the areas of publishing and data management. In particular, we explored whether AIRS prepares students to be agile researchers with the skills to adapt to different research contexts both within and outside academia. The target group for our study consisted of HDR students and supervisors at QUT. Both quantitative and qualitative research methods were used for data collection. Gathering data was by survey and focus groups with qualitative responses analyzed using NVivo. The results of the survey show that 82% of students surveyed believe that AIRS assisted their research process and helped them learn skills they need as a researcher. The 18% of respondents who expressed reservation about the benefits of AIRS were also examined to determine the key areas of concern. These included trends related to the timing of the program early in the candidature and a belief among some students that their previous research experience was sufficient for postgraduate study. New insights have been gained into how to better support HDR learners in partnership with supervisors and how to enhance learning experiences of specific cohorts, including international students and mature learners.

Keywords—Data management, enhancing learning experience, publishing, research higher degree students.

I. INTRODUCTION

IN the current higher education environment of research rich agendas, HDR students are increasingly expected to engage in the publishing of good quality papers in high impact journals. As a result, universities in Australia are investigating appropriate training for PhD students to foster excellence in research, including developing best practice in data management and publishing [1]. This paper focusses on the changing research landscape and the need to cultivate students who are capable of adapting to a range of employment destinations.

Jenny Hall and Alison Jaquet are with the Queensland University of Technology, Brisbane Australia (phone: + 61 7 3138-1426; e-mail: jr.hall@qut.edu.au, alison.jaquet@qut.edu.au).

Research active universities are increasing student intake into PhD programs and Australian demand for PhD students is predicted to grow by 50% by 2020 however a report on university destinations in 2007-2009 shows that 53% of employed PhD students entered nonacademic positions [2]. Thus, a key emphasis of HDR student training should be on developing transferable skills for a diverse, complex, and changing employment terrain.

The present study focused on commencing HDR researchers in the Australian context at QUT and their specific needs around information and research skills. It is the first comprehensive evaluation of QUT's research skills unit, IFN001: Advanced Information Research Skills (hereafter referred to as AIRS), which supports new researchers to produce original and innovative research. In designing AIRS, we have sought to incorporate

- Data and information management
- Publishing strategy
- Publishing impact
- Networking and collaboration

AIRS has a Creative Commons Attribution-Non Commercial-Share Alike license and is currently used by several other national and international universities for their research students, see the AIRS website [3].

This study focused on the learner perspective, asking whether the program develops essential skills to ensure students are confident in areas of publishing and data management. Preliminary findings will be presented of how AIRS prepares students to participate in evolving research environments. The findings indicate avenues for more effective support for HDR learners in partnership with supervisors and ways to enhance the learning of certain cohorts. Initial findings are around how to better facilitate blended learning, recognise prior knowledge, and develop skills in publishing and data management. We also found that AIRS could be better integrated into the HDR learner and supervisor experience.

II. LITERATURE REVIEW

Over the past decade, researchers have investigated the needs of HDR students within current training programs [4]-[6]. Recent research has refined and extended this question, for example, Exner [7] has focused on the information literacy training needs of new researchers while Jackson and Michelson [8] focus on employment of PhD graduates in the Australian context. The literature clearly supports the introduction of managing and organizing research information, current awareness strategies, bibliometrics, publishing

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information, and copyright and open access [9], [10] and data management practices [11]. It is clear that researchers, including doctoral students require a range of advanced information research skills that extend beyond basic information literacies.

Enhanced understanding of the learning and research process for HDRs, including the experiences of conducting original research, is central to effectively supporting this group [7], [12], [13] Booth highlights the difference between the information requirements of undergraduates and research students, and states there are "fundamental differences between information literacy for learning and information literacy for research" [9]. Moreover, there is growing recognition in the literature of the differences between international and domestic students' information seeking and help seeking behavior [14], [15]. New HDR students are often highly motivated to learn new skills, however, they are in a period of transition between previous learning programs and the complexity of a research program, and thus, they require specific training to navigate this new space [16].

A. Research Design

Whilst the main aim of this study is to understand how AIRS assists the HDR student trajectory in terms of developing research literacy skills, it is just as important to understand students' perceptions of the value of the unit. Therefore, a mixed method design is utilized to gather both qualitative and quantitative data. Development of the qualitative and quantitative data measures was fixed at the beginning of the project and the procedures were adhered to throughout data collection [17]. In the study, quantitative data was collected to measure student confidence levels in meeting learning objectives, before and after undertaking AIRS. The retrospective pre then post research design, aims to minimize the response-shift bias where participants' evaluation standard can change in a traditional pre-post design [18]. The second phase of the research involved focus groups using open-ended questions, which encouraged more detailed responses and illuminated key themes, which may not have otherwise been apparent by use of the questionnaire alone.

Ethics approval for this study was provided by QUT Human Research Ethics Committee (approval number 1500000290) on May 6, 2015.

III. RESEARCH METHODOLOGY

A. Survey

The survey instrument comprised ten statements, each item ranked on a five point Likert scale to determine student perception of value (Very Low to Very High) and four open-ended questions (Tables I, II). Key Survey software was used to create the electronic survey.

An email with the participant information sheet and invitation to complete the survey was sent to 1032 HDR students. The email contained a link to the survey which ensured anonymity of participants.

TABLE I
SURVEY CLOSED QUESTIONS TO STUDENTS

Closed Questions
Which faculty are you enrolled in?
Enrolment type? (Indication required of whether student is domestic or international)
How did you participate in AIRS? (indication required of how the student engage, that is, online only, face to face or blended mode)
Please rate your level of confidence in undertaking the resource log assessment after completing the AIRS modules
Please rate your level of confidence in writing a research question
Please rate your level of confidence in translating your research question into searchable statements
Please rate your level of confidence in applying data management principles to your collection, use and retention of data
Please rate your level of confidence in using citation and impact resources to make decisions about where to publish your work
Do you believe participation in AIRS assisted your research process?
Did AIRS help you to learn the skills you need as a researcher?

TABLE II
SURVEY OPEN QUESTIONS TO STUDENTS

Open Questions
Do you believe participation in AIRS assisted your research process? Please tell us more
Did AIRS help you to learn the skills you need as a researcher? Please tell us more
How could AIRS be improved?
Any other comments?

B. Focus Groups

To gain deeper understanding of student and supervisor perceptions of the value of AIRS, focus groups were conducted to collect additional qualitative data. Ten HDR supervisors volunteered to participate in one of three focus groups and twelve HDR students attended one of four focus groups.

The focus groups were organized around a set of predetermined semi structured questions, specific to each of the discrete groups (Table III). All groups were asked the same questions allowing for comparison of uniform data, the moderator also had the flexibility to delve deeper into participants' responses thereby exploring other insights and themes [19].

C. Data Analysis

A total of 287 surveys were collected by electronic submission (Response rate = 28%). Descriptive statistics and content analysis was performed using QSR International's NVivo 10 qualitative data analysis Software [20].

The production of high quality transcriptions of the focus group audio recordings allowed the research team to produce a true representation of the conversations and to present a verbatim account of the interviews to assist unbiased data analysis and development of themes. All nonverbal indicators and any other background sounds (such as sighs, laughs, coughs etc.) [21] as well as any filler words such as (ums, ahs, and you know) were included in the transcript [22].

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TABLE III
FOCUS GROUP QUESTIONS

HDR Supervisors	Students completing AIRS 2014-2015	Students completing AIRS 2012-2013
When you think of AIRS/IFN001 what comes to mind?	What was the immediate impact of doing AIRS on the way you found information, manage data, and publish your work?	Considering the skills and knowhow that you have today how did doing AIRS impact on the way you research?
How significant is AIRS to your students and their HDR trajectory?	How did doing AIRS improve your skills in finding information, publishing your work and managing your data?	What skills and capabilities that you learnt in AIRS do you consider to be impactful on your practice?
Do you see any benefits from your students doing AIRS?	What is your perception of the value of AIRS?	How effective and important was AIRS to your RHD journey?
What are some of the skills/capabilities do you hope your students will take away from AIRS?	Can you tell me a story about the impact of AIRS on your practice?	Can you tell me a story about the impact of AIRS on your practice?
Do you think that those students who engaged with AIRS end up with sharper skills/capabilities in the areas of data management, publishing and impact? Please explain – tell me more	Did doing AIRS save you time in the way you research? Please explain.	What is your perception of the value of AIRS?
Please tell me a story about the impact of AIRS on your student's practice.	Do you perceive any limitations to AIRS?	Have you published? If so, did completing AIRS assist in the process of getting published? How?
Do you perceive any limitations to AIRS?		Do you perceive any limitations to AIRS?
Did AIRS help to prepare your students to publish?		

Recurring concepts and themes were identified (e.g. communication with supervisors, timing of the program, recognition of prior experience, assimilation to university) that characterized perceptions of value or otherwise of the unit.

IV. RESULTS

A. Participant Information

Data was collected from 287 students who responded to the survey: enrolment type (domestic or international), faculty, and mode of participation in AIRS.

Of the 287 respondents to the survey, 25 were excluded due to missing data. Of the remaining 262 respondents, 50.4% were international students and 49.6% domestic students. The number of international respondents was slightly higher than expected given that over the past three years; only 41% of enrolments have been international students. This will be explored further in the discussion.

As Fig. 1 shows, the percentage of responses from students in each faculty corresponds well to the percentage of students enrolled from those faculties in AIRS.
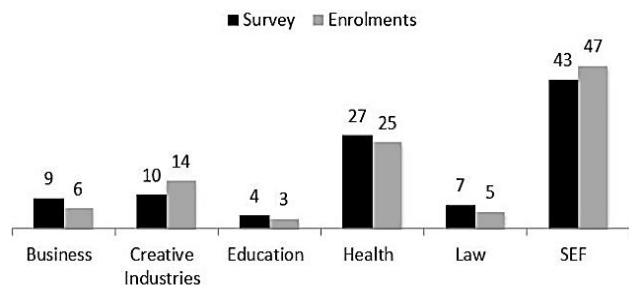

Fig. 1 Percentage of response rates to survey compared to percentage of enrolments by Faculty

Responses indicated that 44% of students participated in AIRS as a blended learning experience while 29% participated online only and 27% only engaged in face-to-face learning (Table IV). The data in Table IV is presented according to the mode in which students chose to undertake their learning: domestic or international

B. Confidence on Learning Objectives

Confidence scores increased on the four learning objectives regarding 1) writing a research question, 2) creating searchable statements, 3) applying data management principles and 4) making decisions about publishing prior to and after completing AIRS (Table V).

TABLE IV
PERCENTAGE OF STUDENTS' MODES OF LEARNING IN AIRS BY ENROLMENT TYPE

Mode	Domestic (n=130)	International (n=132)	Total (n=262)
F2F only	18%	37%	27.5%
Online only	48%	11%	29%
Combination	34%	52%	43.5%

TABLE V
MEAN CONFIDENCE PRE AND POST AIRS FOR EACH LEARNING OBJECTIVE

Objective	Average confidence PRE	Average confidence POST	% increase in average confidence
Research Question	3.0	3.8	20%
Searchable Statements	3.1	4.1	25%
Data Management	3.0	3.9	23%
Publishing	2.5	3.9	35%

Two key objectives of AIRS are to enhance data management and publishing skills. Fig. 2 shows increases in student confidence in managing data and publishing.
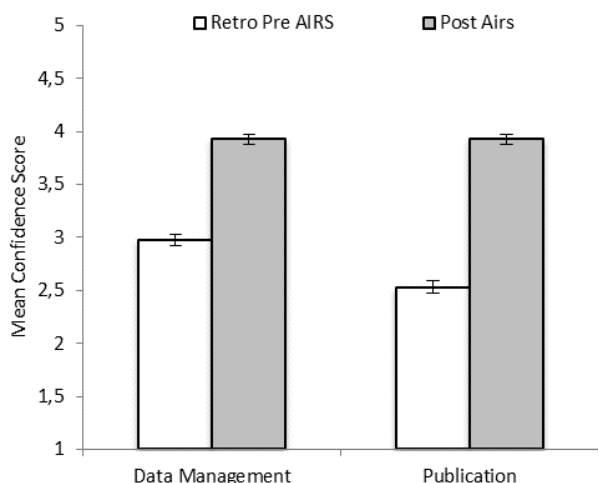
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Fig. 2 Mean Confidence Score Pre (Retrospective) and Post AIRS for Data management and Publishing

C. Responses to Open Questions

We examined the levels of student agreement to questions about whether AIRS assisted their research process and helped them develop skills.

82% of respondents agreed that AIRS had assisted their research process. 10.5% disagreed with this statement and a further 7.5% were unsure. Similarly, 82% of respondents agreed that AIRS helped them to learn skills needed as a researcher. 9.5% disagreed with this statement and a further 8.5% were unsure (Table VI). These responses were further examined in terms of the domestic and international enrolments (Table VII).

TABLE VI
PERCENTAGES OF RESPONSES REGARDING VALUE OF AIRS

Question	Yes	No	Unsure
Do you believe participation in AIRS assisted your research process?	82%	10.5%	7%
Did AIRS help you to learn the skills you need as a researcher?	82%	10%	8.5%

TABLE VII
RESPONSE (%) TO THE QUESTION: DO YOU BELIEVE PARTICIPATION IN AIRS ASSISTED YOUR RESEARCH PROCESS?

	Domestic (n=130)	International (n=132)
Yes	81%	83%
No	13%	8.5%
Unsure	6%	8.5%

Domestic students made up 17 of the 28 students who disagreed with the question "Do you believe participation in AIRS assisted your research process?". Of the 28 students who disagreed that AIRS had assisted them, 20 gave further comments, information about their experiences or suggestions for improving the unit. 10 of these respondents indicated that prior knowledge from completing an Honors or Master's degree, or from work experience as a researcher, ensured that they were already proficient in the skills taught in AIRS. These students expressed that, for them, AIRS was 'a waste of

time' or too basic and that they should have been eligible for an exemption.

TABLE VIII
Q. RESPONSE (%) TO THE QUESTION: DID AIRS HELP YOU TO LEARN THE SKILLS YOU NEED AS A RESEARCHER?

	Domestic (n=130)	International (n=132)
Yes	80%	84%
No	12%	7%
Unsure	8%	9%

Of those who responded 'No' to the question of whether AIRS had helped them to learn the skills they needed (n=25), 2 students nevertheless agreed that AIRS had assisted with their research process. Of those who were unsure of their response to this question (n=22), 7 had responded that AIRS assisted with their research process.

Further analysis was conducted to examine the confidence scores of students who responded No, Unsure or Yes to *both* of the open questions:

- *Q. Do you believe participation in AIRS assisted your research process?*
- *Q. Did AIRS help you to learn the skills you need as a researcher?*

Twenty students responded 'No' to both questions ("No" group), 12 were unsure about both questions ("Unsure" group) and 207 responded 'Yes' to both questions ("Yes" group). The pre- and post- ratings of confidence on the two key objectives were also compared (Figs. 3-5).
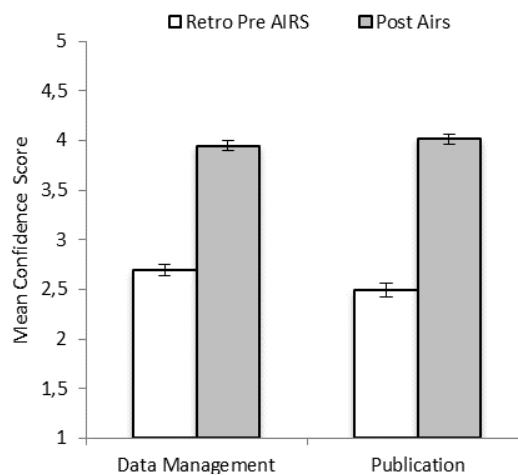

Fig. 3 Mean Confidence Pre (Retrospective) and Post AIRS about Data management and Publishing for students who agreed with the value of AIRS for their research skills and process ("Yes" group).

Fig. 3 shows that there was a large increase in mean confidence for the "Yes" group regarding data management and publishing. Students from the "Unsure' group (Fig. 4), nevertheless reported increases in confidence in managing data. Students who disagreed that AIRS had value (No group) showed no change in confidence, and higher overall mean confidence in their retrospective pre-ratings than the "Yes" group and the "Unsure" group.

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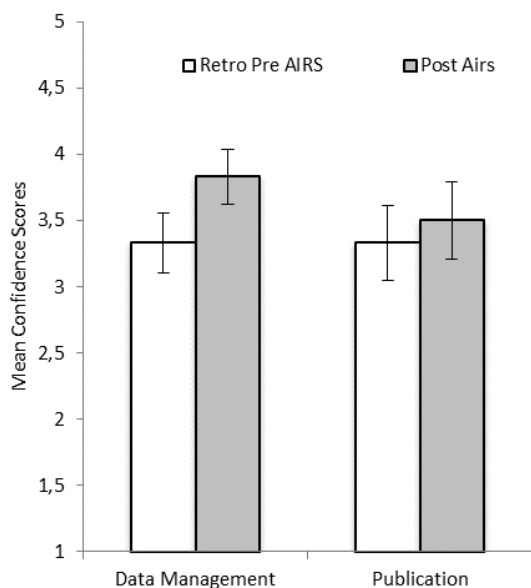Vol:10, No:4, 2016

Fig. 4 Mean Confidence Pre (Retrospective) and Post AIRS about Data management and Publishing for students who were unsure about the value of AIRS for their research skills and process ("Unsure" group)
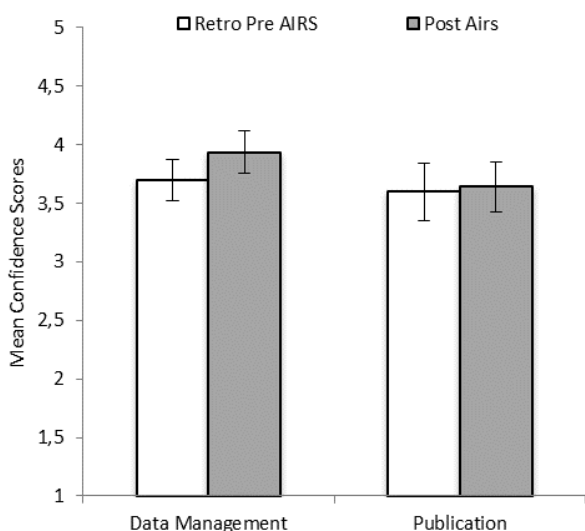

Fig. 5 Mean Confidence Pre and Post AIRS regarding Data management and Publishing for students who disagreed with the value of AIRS for their research skills and process ("No" group)

V. DISCUSSION AND THEMES

A. Engagement/Learning Mode

AIRS has been designed as a blended learning experience, but students can complete their learning and assessment using only the online resources. Several students indicated that they appreciated the flexibility of this mode:

- *I did everything online I didn't come to any of the workshops – I found the modules really good*
- *I like the ability to join face to face sessions or do it on-line.*

We had assumed that most students would access online materials at some point to complement their learning. However, our results show that over a quarter of respondents did not venture online at all. 27.5% of respondents (n=72) completed AIRS only in the face-to-face workshop mode and did not participate in any online learning. Of this group, 68% (n = 49) were international students.

Certainly, the literature points to a growing recognition of the differences between international and domestic students in terms of information seeking and help seeking behavior [14]-[15]. Of particular interest are Liao's [15] findings that international postgraduate students are more likely to attend instruction or workshops as compared with their domestic (US) counterparts. Liao [15] suggests that many of the electronic resources and information seeking behaviors common to American undergraduate students are new to the international postgraduate student. This claim correlates with the findings of this research project and the attendance records at face to face workshops of higher numbers of international students compared to domestic students. In addition, Liu and Winn [23], in their study of Chinese graduate students' information seeking behaviors at the University of Windsor, found that international students are not inclined to ask for individual help to solve problems while Liao found that some international students used the library not only for research but as a place of social interaction, a place of connection. Thus, it can be argued that the compulsory nature of AIRS, unlike other programs for HDRs, and its position in the library, encourages engagement for international cohorts. It also might suggest why international students were slightly over-represented in this study due perhaps to their strong connection to the AIRS unit and willingness to engage. Indeed, one student reflected that interaction with librarians in AIRS was beneficial: "*I have found the course very useful, I enjoyed meeting the librarians face to face - it gave me confidence to come forward and use the library and its resources*". Furthermore, there seem to be several reasons that encourage international students to utilize the face to face learning modes rather than the online or blended modes. These reasons include the opportunity to participate in a group setting, gain research experience in an open environment with other students at the same developmental stage in the higher degree, thereby facilitating help seeking behaviors and a community of practice [24]. Given the heavy use of the online learning space and the desire for interaction with peers in on campus workshops, integrating more social or peer-to-peer learning opportunities could be beneficial, as this student reflects:

> *It would be useful to launch a community for PhD students and the AIRS program would be a great way to connect them.*

Certainly, the idea of a community of practice has been discussed widely in the literature [24], [25]. Learning spaces in AIRS can be considered a potential site to build a community of practice within the larger research community. When it comes to relationship building, networking and meeting likeminded students at a similar stage in their doctoral

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journey there is a real sense that AIRS assists some students to develop the social dimensions or social practices to assist with integration into the research community. The comment by this student supports this idea:

From AIRS I made new friends I mean like before AIRS...I'm lonely I don't know how/where to make friends. I come to AIRS, I got a couple of friends... it helps me a lot actually.

This important social dimension of learning should be considered in future for both online and on-campus delivery of AIRS.

B. Prior Knowledge vs Novices

A key theme that arose in the qualitative survey data was that some students felt their prior learning of research skills was sufficient for postgraduate study. While these students acknowledged the value of AIRS for inexperienced researchers, they felt they had already developed the skill base that AIRS teaches, and wanted to have prior learning and existing experience recognized:

AIRS was a bit of a hoop to jump through, having done 3 years of undergrad at QUT, and then a year of honors which is a full research year, and then to get into the PhD and then kicking back to the beginning of honors – it would have been nice to know this stuff then.

A HDR supervisor also distinguishes between novice researchers and more experienced research students:

I think also at PhD, some people may have been in the workforce for a long time or may not have been studying recently, other people may have just done their undergrad degree, done honors – bang into PhD and they probably know that inside out.

10 of the 15 students who expressed the belief that they had equivalent prior learning and experience in research were domestic students. This might account for the domestic students being overrepresented in the groups who responded 'No' to questions around whether AIRS assisted their research process and learning of skills. Unsurprisingly this group who responded 'No' to both questions has higher initial confidence scores on data management and publishing, and the least change of all groups, including those who remain unsure about their AIRS experience. Those who agreed that AIRS had assisted their research process and learning of skills showed the most gains in confidence. However, there were divergent views. One supervisor stated that: "*even for the experienced researcher there are things that they can learn from this unit*". Another supervisor went further to argue that some experienced students lack crucial skills on entry to a PhD. Others were clear about the need for AIRS for international students as a way to 'learn QUT systems' and for those students who are returning to research after a significant gap:

I think for my student who has just done [AIRS], she is a mature student, returning to study – after 25yrs everything has changed you know she said when she did her bachelor degree you used the index cards, I remember doing that even just knowing what online databases are and everything there's no way she would

be able to do this without [AIRS] – you know that sort of thing has been absolutely huge. And so I'm so grateful for that purpose.

It is clear then that a nuanced approach is necessary in order to understand the information literacies and skill sets of returning students. The challenge for institutions implementing cross disciplinary advanced information research skills programs, is to ensure well developed skills and attributes are reached as a basic tenet of research support whist bridging the skills gap between the research literate haves and have nots [26].

Several research papers address the level of information literacy training required by doctoral students to meet the growing need for them to be research ready, to develop graduate capabilities, to publish while undertaking candidature and to align with the research imperatives of their institutions [10], [27]-[29]. AIRS is offered in the blended mode, students are not required to attend workshops and can engage with the entire content online. What seems to be unclear to some students, particularly those with preexisting research capability is that the end product of the unit is a resource log and if they possess the skills and capabilities to complete without engaging with the learning resources they may do so. Moreover, it may suggest a need to more clearly communicate to students the processes for applying for exemptions and advanced standing.

C. Publishing and Data Management

Typically, researcher training offered through libraries is based on information retrieval skills rather than the development of information management, licensing and copyright, open access metadata and developing a publishing strategy [9], [10]. When AIRS was redeveloped in 2012 the aspects of publishing and data management were considered to be a vital addition to our HDRs' skills and capabilities. The push to publish early, or during candidature has been discussed widely in the literature [28]-[30] and the ability to make good well-founded decisions regarding where to publish is now considered a core skill of the doctoral student.

The importance of learning more about publishing strategies is expressed by the following students:

- *In terms of publishing having an online presence, registering with Research Gate and having an ORCID ID those sessions were pretty useful – It makes a good difference.*
- *I haven't gotten to publishing but again [AIRS] opened up how to find where I may want to publish, and how to find out what [publishers] criteria is and to address it, because again it's better to know that before one does the writing so I can address the parameters.*

Our results showed that students made gains in confidence around learning about publishing and data management with increases in confidence of 23% and 35% respectively. Indeed, only 3 students reported Very Low confidence in data management and publishing after completing AIRS. It is possible that our research design, a retrospective measure of confidence prior to undertaking AIRS, may have skewed the

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effect. A further iteration of this study in which confidence is measured prior to embarking on AIRS will test the validity of this result. It is noteworthy, however, that of all students reporting low or very low confidence around data management or publishing after completion of AIRS (n = 21), 67% had completed AIRS in one mode only: solely through attending workshops or completely online. With only 33% of students engaging in blended learning, recognition of the experiences of those cohorts who exercise their choice to exclude either mode, is useful in designing learning for the future.

High quality data underpins all endeavors to produce influential research and publish in high quality journals. As such, Gorsuch, editor at MacMillan Publishers states that, as researchers, "data should be at the heart of everything we do" [31].

It was clear from the comments of students with varied levels of experience, that data management is a new and valuable concept in AIRS:

- *Most of the content seemed very basic, but I certainly received some inspiration on how to store my research data better.*
- *My literature search, data management, documentation, and referencing skills have significantly improved.*
- *AIRS reminded me to be more careful with data management.*

Effective research data management is the foundation for the responsible conduct of research, and applies all stages of the data lifecycle, including dissemination of results through publishing. In the authors' opinion, research data management is a core skill that doctoral students need to participate fully in the research culture of universities, one that encourages best practice of research and dissemination of research results. It is important for students to understand that research is not the end game, communicating the knowledge to make the world a better place is the end game [32].

D. Research Context at QUT

AIRS is not the only coursework or skills training available to HDRs at QUT. There are discipline-specific programs and resources that introduce new HDRs to research methodologies, writing for publication and other skills. Indeed feedback from one supervisor indicated ways in which AIRS intersects with other programs in specific schools:

I'm also running a research methods unit for Masters level Engineering students ... but this year I had lots of PhD and Masters by research students attending the unit so they found some of the content in AIRS actually covered in my unit.

This suggests a need for increased communication and awareness between research programs and units to ensure duplication is reduced for students. However, AIRS is the only mandatory coursework unit for all PhD candidates and, as such, provides an opportunity to ensure all candidates have baseline knowledge and skills from the outset of the research journey.

Some students reflected that the timing of AIRS, at the beginning of their candidature, allowed them to build understanding and connections:

- *AIRS was absolutely invaluable. I already had good skills in several areas. I also thought I had good skills in other areas where I was clearly making assumptions that were not valid. I am very pleased that I did this course as early as possible.*
- *The most immediate impact for me was that the starting point in doing the PhD ... you sign up, you have a meeting with your supervisor – it's like well what's next. So then AIRS is like a springboard to start the PhD – focusing on all the areas that you needed to focus on.*

In contrast, some students felt overwhelmed at the outset of their candidature and found AIRS in the first three months, as one student states: "*It was all too much too soon*". However, one supervisor suggested that there is a need for clear communication to HDRs about the close relationship between AIRS and the broader research journey:

I think it does need to be reinforced a bit that ... you're doing this as part of your actual process of your PhD – that this is part of it – it's not a separate thing that just you do...

Another supervisor extended this idea, indicating that he intends to reinforce the learning that begins in AIRS in order to support his HDRs:

There's a slight disconnect between the student experience in AIRS and my role as a supervisor, so that if there are questions in the AIRS materials that are asking about their research question then as a supervisor I am not necessarily aware of what they might be seeking input [others agreeing in the background] on and so there's a little bit of a gap that I'm appreciating now um in terms of how the dots might be joined um to support student's PhD progress.

This suggests a need to consult widely and engage a diverse group of students and supervisors to ensure the continued relevance of AIRS in the HDR journey.

VI. Conclusion

This research has highlighted the unique challenge of meeting the needs of HDR students and their supervisors in the current research environment. While participants in this study indicated that AIRS is enhancing confidence around key skills and providing worthwhile learning experiences, some assumptions about the learners' experiences have come to light. Key findings include supporting the social dimension of learning in blended delivery, the specific needs of international students, and those with prior research experience. Future research directions might elicit the views of alumni and employers to deepen the understanding of skills needed for diverse employment destinations and to ensure that AIRS remains relevant and aligned with university and industry priorities.

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