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A Taste of Research: Preliminary Insights from an Undergraduate Research Training Cadetship Project in a Western Australian University Offering Experiences Outside the Classroom

Caitlin Fox-Harding, Kristina Kendall, Tenielle Porter, Brianna Fleay, Shelley Beatty, Ruth Wallace
School of Medical & Health Sciences, Edith Cowan University, Australia.

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Abstract

This paper assessed the impact of a Student Research Cadetship Program aimed at providing undergraduate students with extracurricular research opportunities within the School of Medical & Health Sciences at Edith Cowan University. This preliminary evaluation, comprising two studies, explored the outcomes, benefits, and challenges experienced by students and academic staff. Study 1 analysed outputs from cadetship projects between 2016-2023 (n= 80 students; 42 academics). Notably, cadets contributed to over 60 research outputs, with 30% of cadets transitioning to postgraduate studies following competition of the program. Study 2 focused specifically on the 2023 program, highlighting positive impacts on academic staff and cadets, showcasing improved skills, heightened confidence, and increased career aspirations. Despite challenges in resource allocation, the program has gained traction, offering valuable research experiences for students and enhancing research outputs. The program serves as a model for other disciplines, emphasising the need for sustained institutional commitment and resource allocation.

Keywords: *undergraduate research experiences; research training; research cadetship program.*

1. Introduction

Australian universities have long acknowledged the provision of undergraduate research training opportunities as an important strategy to ensure student advancement (Boyer Commission, 1998). Despite the endorsement of an enhanced teaching-research nexus by numerous Australian higher education institutions, reports have drawn attention to the

insufficient allocation of resources to sustain these aspirations (Brew & Cahir, 2014). Offering students authentic opportunities to engage in research training as extra-curricular, work-integrated-learning (WIL) activities benefit not only the students themselves but also the researchers they work with, and the universities at which they study (Miller et al., 2022). Offering such opportunities to currently enrolled students is commonplace (for example: Carson et al., 2018; Hanauer et al., 2017) and such initiatives have reported being associated with many benefits. Students exposed to real-world research projects outside the classroom have been reported to build key employability skills such as critical thinking and communication, whilst learning about important ethical processes (McLaughlin et al., 2020). Such students are also reported to be attracted to postgraduate studies and research careers through developing and enhancing their research, collaboration, and networking skills (Stanford et al., 2017), whilst contributing to research outputs (Mass-Hernandez et al., 2022). Encouraging students to develop positive attitudes and appropriate behaviours as researchers helps promote a culture of undergraduate research, embedding the drive for evidence-based practice (Brew & Mantai, 2017). Furthermore, students build skills in interpreting research results, understanding how knowledge is constructed and that assertions require supporting evidence (Stanford et al., 2017). For academic staff, the benefits of supporting undergraduate research include the personal satisfaction from mentoring students and helping them develop new skills (Stanford et al., 2017) whilst improving their academic promotion prospects (Dolan & Johnson, 2009). The benefits to universities include better student retention and increased enrolments in higher degree by research (HDR) degrees (Moore et al., 2008), alongside increased publications that increase visibility in the research community (Stefanucci, 2019).

While providing undergraduate students with extracurricular research training opportunities has many reported benefits for students, researchers, and the university, it requires support from academic staff and enticing academics into this sphere requires adequate support and resources (Brew & Mantai, 2017). Such programs can present challenges and the establishment of an undergraduate research culture may be hindered by insufficient structural, financial, and administrative resources (Brew & Mantai, 2017).

At Edith Cowan University (ECU), the School of Medical & Health Sciences (SMHS) established a Student Research Cadetship Program in 2016, based on the 2006 University of Wollongong Library Professional Cadetship model, with the aim of providing extra-curricular research opportunities for students interested in getting a ‘taste’ of research beyond their curriculum-based units. Such opportunities, described as “research-based scholarly experience/tasters” (Brew & Mantai, 2017, p. 562), were intended to fulfill the strategic goal of “building it’s HDR program…to support a strong and distinctive community of research students who will succeed in their research careers” (ECU, 2022, p. 14), whilst increasing the volume and quality of research outputs and increasing HDR student numbers and completions (ECU, 2022). SMHS offers >40+ courses across the disciplines of public health, occupational

safety and health, exercise and sports science, exercise rehabilitation, paramedicine, speech therapy, occupational therapy, biomedical science, and dietetics. Some of these courses (but not all) offer opportunities for students to engage in a fourth year of study (Honours) whereby they undertake a yearlong research project, but this is limited to small numbers of high-achieving students. All SMHS students undertake one or two inter-curricula research units, but studies have suggested that undergraduate students tend to dislike these units and have difficulty relating them to their future careers (West & Maier, 2017). Students completing research training units of study in SMHS typically note similar experiences (e.g., UTEI report for HST2122, 2023-2).

SMHS is one of the largest and most research-intensive schools at ECU, leading cutting-edge research through research centres such as the Exercise Medicine Research Institute, the Nutrition and Health Innovation Research Institute and the Centre for Precision Health. SMHS generated half of ECU's research income between 2018-2022 and has established strong research collaborations across all ECU schools, nationally and internationally (Sim, M, personal communication, 24 April 2023). This strong research presence provides many excellent opportunities for student involvement in the School's annual Student Research Cadetship Project. This paper presents a preliminary evaluation of the SMHS Student Research Cadetship Program, shares details of the Program characteristics, and describes the outcomes, benefits and challenges experienced from the perspectives of students and researchers who engaged with the Program.

2. Methods

2.1. Overview of cadetship program

The SMHS Student Research Cadetship Program was established in 2016 and aimed to increase student engagement in research as an extra-curricular WIL experience whilst assisting academics to enhance research outputs. In this program, a research cadet is defined as a student who is engaged in a research training program, with their participation guided by experienced researchers or mentors. The Program is coordinated by a team of SMHS academics without any financial or administrative support from the university. Academic staff were invited to develop a brief expression of interest advertising a discrete element (or 'mini-project') of their research that could be undertaken by a student (research cadet), to a maximum of 180 hours to be completed in a six-month period (typically between April-October). Typically, a myriad of 'mini-projects' are put forward, incorporating a wide range of research activities that may include systematic literature reviews, laboratory-based activities, participant recruitment, data collection, data analysis and synthesis. These 'mini-projects' were ratified by the school Executive Team before being advertised to eligible students. Students enrolled in undergraduate or Master by Coursework degrees, with a Weighted Average Mark of at least 70%, were sent a

personalised email, inviting them to submit an application (or applications) for the advertised mini-projects, comprising a resume and statement of intent. Students enrolled in research degrees (e.g., Honours, Master by Research, PhD) were not eligible to apply as they were already engaged in research training. Researchers assessed the student applications they received and selected those with the best fit to their project, subsequently adopting the role of 'supervisor' to the student. Once this relationship was established, researchers and students (now cadets) worked together for the duration of the mini-project. When the Program ran between 2016-2021, students completed a feedback form at the end of their cadetship. However, since 2022, a research symposium has been conducted at the end of the year, whereby cadets present their research experience to academics and fellow cadets engaged with the Program.

Two sub-studies were conducted to investigate the outcomes, benefits and challenges experienced by students and academics engaging with the Program. Human Research Ethics Approval (HREC #: 2023-04229) was obtained from Edith Cowan University.

2.2. Study 1: Cadetships (retrospective outcomes for cadets and supervisors)

Academics who had supervised cadets in previous years were requested to provide feedback on various research outputs resulting from the project, such as abstracts, grants, and publications. A search of student records identified those student research cadets who had subsequently enrolled in postgraduate studies at ECU. This presented a chance to document comprehensive, archived data from the Program's inception thus capturing the progression of cadets into higher-degree research (HDR) or further graduate studies. A descriptive analysis of documented trends was conducted based on self-report from academics and student enrolment records.

2.3. Study 2: Evaluation of the 2023 Program

A purposive sampling strategy was implemented, targeting all academics (n=12) and student cadets (n=20) who had been involved in the SMHS Student Research Cadetship Program throughout 2023. Academics and students not involved in the 2023 program were not invited to participate. Participant recruitment was conducted via email, and informed consent was obtained at the commencement of the survey via Qualtrics. The survey was based on Lopatto's 2007 study of undergraduate research experiences. Academics were asked to identify the skills and attributes they perceived their cadet had developed during the course of the project; the cadet's contribution to any research outputs; and their willingness to supervise the cadet as a potential post-graduate student. Similarly, the Cadet Survey asked them to identify the skills and attributes they thought they had developed; the research outputs they had contributed towards; and their intentions regarding enrolment into postgraduate study. Data were cleaned, aggregated and analysed descriptively through Qualtrics functionality.

3. Results

3.1. Study 1: Cadetships (retrospective outcomes for cadets and supervisors)

Between 2016-2023, 80 students and 42 academics had been involved in the Cadetship Program. Approximately three-quarters of students were female (72.5%, n=58) and the majority (91.25%, n=73) were enrolled in undergraduate degrees at the time of completing the Cadetship Program (Table 1.).

Table 1. Demographic information. All descriptive statistics represent sample n (percentage).

n	**80**
Gender	
Female	58 (72.5%)
Male	22 (27.5%)
Degree Enrolled	
Undergraduate	73 (91.25%)
Post-Graduate (Graduate Certificate)	1 (1.25%)
Post-Graduate (Master by coursework)	6 (7.5%)

3.2 Cadetship research project outputs

Academics reported that, during their cadetships, students had been tasked with performing literature reviews, data collection and analysis, drafting of manuscripts, reports, and grant submissions. Since 2016, 14 journal articles have been published based on findings from research projects to which cadet students had contributed, with an additional 20 manuscripts drafted for journal submission (Table 2). These manuscripts had included students as listed authors or named within the acknowledgement sections. In additional to journal articles, students had been involved in the development and submission of reports to state and national bodies (n=3), book chapters (n=2), and grants (n=2). Lastly, 24 students had contributed to abstract submissions to conferences or had directly attended and presented at conferences during their cadetships. All information regarding the publication and submission of articles, reports, conference abstracts have been confirmed at of 26/01/2024.

After completion of the cadetship, 24 students (30%) enrolled in postgraduate degrees including those focusing on research and course work (Table 3.).

Table 2. Research output information. All descriptive statistics represent sample n.

Research Output	Total
Published Journal Articles	14
Drafted Manuscripts	20
Published Books	2
Published Reports	3
Grant Submissions	2
Conference Abstracts/Presentations	24

Table 3. Post Cadetship Enrolment Information. All descriptive statistics represent sample n (percentage).

Degree Enrolment Post Cadetship	
Honours	2 (2.5%)
Masters	21 (26.25%)
PhD	1 (1.25%)

3.3. Study 2: Survey results 2023

The survey was completed by four academics and six cadets who completed the Cadetship Program in 2023.

Academics (n=4) who participated in the 2023 Research Cadetship Program represented diverse disciplines such as teaching and learning; medical science; biomedical science; and allied health. Notably, three out of the four surveyed academics were early-career researchers. The reported research outputs attributed to the cadets by academics encompassed data analysis and presentations. Additionally, half of the academics expressed their willingness to mentor their cadets as postgraduate research students.

In the assessment of skills and attributes refined by cadets during the Cadetship Program, 75% of academics reported the students demonstrated heightened confidence, enhanced oral communication skills, and a deeper grasp of knowledge construction. Furthermore, a significant proportion of academics expressed ‘agreement’ regarding their cadets' improved comprehension of the research process, adherence to ethical standards in research, and proficiency in written communication. Additionally, 50% of academics noted advancements in cadets' capacity for independent work, assumption of responsibility, and proficiency in result interpretation, and noted they would be prepared supervise the student if they expressed an interest in postgraduate research.

Upon completion of the cadetship experience, six cadets completed the survey. The majority of student cadet participants either 'agreed' or 'strongly agreed' with various statements in the survey assessing the positive impacts of the Program. Notably, 67% of respondents expressed "*an enhanced understanding of their career path*", while the same percentage (67%) agreed that they "*acquired skills in reading and comprehending primary literature*". Additionally, all participants (100%) considered felt they had "*learned how to deliver effective presentations*". Furthermore, 83% of respondents acknowledged "*improvement in their writing skills*" and "*gained self-confidence*", while a similar percentage (83%) recognised "*a better understanding of how to work independently*". Lastly, 67% of cadets indicated that they became part of a learning community through their participation in the program. Noteworthy was the future academic aspirations of the cadets, with 83% (five out of six) planning to pursue postgraduate studies, while one student intended to engage in postgraduate coursework**.**

4. Discussion

Since its inception in 2016, the SMHS Student Research Cadetship Program has successfully fostered student engagement in research as an extracurricular Work-Integrated Learning (WIL) experience while simultaneously aiding academics to enhance their research outputs. By inviting academics to propose discrete elements or research mini-projects for student involvement of up to 180 hours of research training, the Cadetship Program has provided valuable hands-on research experiences for undergraduate students, such as performing literature reviews, data collection and analysis, drafting of manuscripts, reports, and grant submissions, which may not all be featured in typical undergraduate degree curriculum. With over 100 students benefiting from the SMHS Cadetship Program to date, some have also had the opportunity to present their work at external conferences and therefore translate their research experience beyond the actual research project with which they were engaged.

This preliminary research study has presented a retrospective analysis of student research cadet outcomes alongside the perspectives of current cadets and their academic supervisors. The retrospective outcomes data (Study 1) revealed that the cadets contributed to over 60 research outputs and 30% have enrolled in postgraduate studies at the University, benefiting the students in terms of improved employability outcomes (McLaughlin et al., 2020). The results from Study 2 suggested the Program's positive impact on both students and academic supervisors. The majority of academics reported perceived improvements in cadets' skills, highlighted as beneficial in previous research, including heightened confidence, enhanced communication abilities (McLaughlin et al., 2020), and a deeper understanding of knowledge construction (Stanford et al., 2017). Of note, three of the four academic supervisors were early career researchers, demonstrating the importance of the Cadetship Program for them to 'cut their teeth' as a research supervisor in the supportive environment of the Research Cadetship Program. Notably, having been exposed to research projects outside the curriculum of their current course

and having worked on key employability skills, 67% of cadets felt they had developed an enhanced understanding of their career paths, and 83% planned to pursue postgraduate studies, a documented outcome of such opportunities (Stanford et al., 2017). Moreover, two of the four supervisor participants indicated their willingness to supervise their cadet in postgraduate studies. This suggests that a Cadetship Program can assist academic supervisors to get to know a student before committing to their formal supervision in a postgraduate program. Likewise, the Cadetship Program provided students with an opportunity to sample life as a research training student prior to committing to a higher degree by research. The strengths of this study are that we were able to draw on and ratify several years of retrospective data regarding the research outputs/outcomes and postgraduate enrolments from academic sources. This study is not, however, without limitations. The small and non-random sample size of Study 2, limited to program participants only renders the results ungeneralisable to a wider population. Moreover, the reliability and validity of the data collection instruments were not subject to scrutiny. Moving forward, completion of end of program surveys by academic supervisors and cadets will be a requirement to access a certificate of completion which students can add to their resume further enhancing their employability. For supervisors this will include specific details of the outputs/outcomes contributed to by the cadet. Furthermore, while the SMHS Students Research Cadetship Project has been sustained over a number of years (since 2016), the evaluation of the project has not been consistent over the years largely attributed to the voluntary nature of the program's management, hence we acknowledge the data presented here is preliminary.

Implementing a student research training cadetship project is not without challenges and it is important to acknowledge the lessons we have learned: (1) The program needs support from the School leadership team if not overseen by a senior academic; (2) The Program relies on academics who are willing to mentor research cadets, and who have the time and energy to do so; (3) A robust evaluation process is essential to ensure outcomes are measured and reported consistently; and (4) The provision of adequate support is crucial for sustaining and expanding programs like the Student Research Cadetship Project, including allocating resources to facilitate effective mentorship, research infrastructure, and administrative support. Moving forward, a concerted effort should be made to secure the necessary resources and institutional commitment to uphold the integrity and impact of such valuable experiential learning programs.

The SMHS Student Research Cadetship Program has thus far proven to be a dynamic platform facilitating meaningful research experiences and fostering academic research aspirations among participating students. Our preliminary findings underscore the potential replicability and scalability of the SMHS Student Research Cadetship Program to other disciplines and universities. The success witnessed in enhancing self-reported student engagement and fostering valuable research experiences prompts us to consider sharing our model as a noteworthy exemplar. While acknowledging its effectiveness within the medical and health sciences domain, caution is warranted in assuming universal applicability across diverse fields of study.

To ascertain the generalisability of our model, there is a need for deliberate trials in other academic domains, paving the way for an evidence-based expansion. We advocate for a call to action in future research and collaborative endeavours, encouraging institutions and researchers to trial similar programs in their respective disciplines.

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