

Initiatives of Australian Public Universities to Increase Indigenous Australian Student Enrolment in and Completion of Science courses: A Case Study



UNIVERSITY *of*
TASMANIA



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OF WOLLONGONG
AUSTRALIA



Australian Council
of Deans of Science

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Abbreviations

ACDS	Australian Council of Deans of Science
HDR	Higher Degree by Research
ISU	Indigenous Support Unit
ITAS	Indigenous Tutorial Assistance Scheme
STEM	Science, Technology, Engineering and Mathematics

Executive Summary

The Australian Council of Deans of Science (ACDS) engaged the University of Tasmania to undertake a study of the initiatives currently exercised by Australian universities to recruit Indigenous students into science courses and, once enrolled, to support them through to completion. In light of the increasing emphasis on holistic support (i.e. faculty-level and university-level) for Indigenous students, this pilot study, run from the University of Tasmania's College of Sciences and Engineering in collaboration with the University of Wollongong, sought to examine how such recruitment and support initiatives were operative on a faculty-level in Australian universities.

In June 2019, invitations to an on-line survey were sent to the 37 member institutions of the ACDS, both the student admissions department (survey later discontinued, see below) and the science colleges/faculties/departments. The focus of the second survey was to understand how the university's science college/faculty/department engaged towards Indigenous students in the following areas: recruitment; enrolment support and pathways; degree/course support; graduation and scholarships, and; research recruitment and training. Of the contacted institutions, 11 responded and took part in the survey. Responses were then re-presented in tables to undertake comparative analysis between the initiatives of participant institutions.

The results demonstrate that initiatives to engage, recruit, retain and graduate Indigenous students largely do not operate at the college/faculty/department level. Instead, such initiatives are run at the university-level by specific departments (e.g. student admissions, scholarships and bursaries) or are led by the university's specialist Indigenous support unit. Where the science college/faculty/department was found to be involved in engagement and support initiatives, this tended to be at the recruitment stage through the provision of school-visitation and mentoring programs.

The report concludes with a set of recommendations to the ACDS and its member institutions to address the shortcomings highlighted within this study. These recommendations entail the formulation and implementation of recruitment and support initiatives for Indigenous students, run by the member colleges/faculties/departments themselves, guided by counsel acquired through consultation with Indigenous communities, Indigenous support units and Indigenous graduates. It is hoped that this report will assist in the increase in the enrolment, retention and graduation of Indigenous students in undergraduate, postgraduate and research science degrees.

Overview

Across Western (colonised) countries there are increasingly stronger calls for universities to do more to support Indigenous peoples, both in terms of the offered curricula (curricula Indigenisation), and the measures executed to assist First Peoples enter and graduate from tertiary education. Simultaneously, campaigns have been launched to encourage Australian youth to consider enrolment in STEM courses, particularly those from marginalised and/or underrepresented groups, including Aboriginal and Torres Strait Islander Australians.¹ Collectively, there is a growing interest to identify the means by which Australian university science faculties and colleges can assist the recruitment and graduation of Indigenous Australians from science courses.

In Australia, scholarly and governmental reports alike indicate that whilst there has been improvement in some spheres for Indigenous tertiary education (such as targeted scholarships), there remains a core deficiency in the framework employed by universities; namely, the delegation of Indigenous matters to specific university bodies/units. The 2012 Behrendt Report (Behrendt et al. 2012) advised that there needs to be a ‘whole-of-university effort’ and that ‘faculties should be primarily responsible for supporting the academic success of Aboriginal and Torres Strait Islander students, given the discipline-based knowledge and staff available to them’. With such recommendations having been made, the sincerity of the commitment of universities and their faculties to Indigenous people can be demonstrated by the ways in which support is developed and implemented at the science college, faculty, school, institute (or equivalent) (hereafter collectively referred to as ‘faculty’) level, rather than at the Indigenous Support Unit level, as has been the case historically.

These considerations raise the question of what is *actually* being done at the faculty level to facilitate the engagement, recruitment, retention, and graduation of Indigenous Australians within science courses at Australian universities? To assist in answering this, the University of Tasmania and the University of Wollongong have undertaken a pilot study seeking to understand what relevant initiatives are operating in Australian universities. The pilot study draws on survey data collected for the project, which provides a set of case studies of 11 Australian science faculties. The report, herein, highlights and comments on some of the key strengths and limitations of these initiatives in order to stimulate further consultation and analysis, and to instigate development of better practices.

This report has been prepared for the ACDS to assist in its efforts to further the accessibility and attainability of science courses in its member institutions to Indigenous Australians. This research was a collaborative project between the University of Tasmania (Drs. Guerzoni, León de la Barra and Taylor) and the University of Wollongong (Associate Professor Kuit). It was financed by the University of Tasmania’s Indigenous Student Success Program, the University of Tasmania’s College of Sciences and Engineering, and the ACDS.

The report comprises four parts:

1. A precis of the contextual concerns regarding Indigenous presence in and completion of tertiary education.
2. A description of the method and research process of the project.

¹ For the purpose of this report, Aboriginal and Torres Strait Islander Australians will be hereinafter referred to as Indigenous Australians.

3. An overview of the findings.
4. Discussion and recommendations, with an emphasis on continued effort in respect to Indigenous Australians.

Context: Indigenous Australians and Tertiary Education

Indigenous Australians are under-represented within tertiary educative institutions as both students (at all levels), academics and professional staff (Smith et al. 2018; Bennett 2015). In terms of student numbers, for 2018 it was recorded that Indigenous Australians formed only 1.3% of the total number of enrolled university students in Australia, down from 1.5% in the previous year (Department of Education and Training 2019a). For the same year, only 1,143 Indigenous Australians (that is, 6.5% of all Indigenous university students) were enrolled in Natural and Physical Science courses compared to a total of 103,327 of non-Indigenous domestic students and 26,282 international students (Department of Education and Training 2019b).

Similarly, the rates of retention and completion amongst Indigenous Australian tertiary students remain low compared to their non-Indigenous counterparts (Koshy, Dockery & Seymour 2017). Of the 2015-2018 tertiary student cohort (across all disciplines), 16.8% of Indigenous Australian students did not return to university study after their first year, and 27.6% of Indigenous Australian students who re-enrolled later went on to withdraw; for non-Indigenous students the rates stand at 7% and 15.3%, respectively (Department of Education and Training 2019b). Indeed in 2018, only 156 Indigenous people were awarded degrees in the Natural and Physical Sciences, compared to the total 20,537 domestic students and 6,127 international students (Department of Education and Training 2019c). The disparity of Indigenous Australians' participation in tertiary education is clear and concerning.

The reasons for the disparities faced by Indigenous Australian students are multifaceted and complex. Studies have highlighted that a series of systemic factors hinder Indigenous Australians from receiving a university education, including: distance from university campuses (if living in remote and regional areas); an inability to finance travel, relocation and/or accommodation costs; a lack of social capital that encourages tertiary education (family, friends, and other community members); commitments to family and community; unfavourable schooling results; incompatibility with high school and university teaching methods (particularly in areas of STEM); personal factors (health, family troubles, poverty); and inability to access on-campus support (Anderson, Bunda & Walter 2008; Dreise and Thomson, 2014; Pitman et al. 2017; Michie, Hogue & Rioux 2018; Hogue 2016; Boon 2012; Ball 2015). Overall, it is the social disadvantage that Indigenous people endure as a consequence of colonisation that instigates and compounds these systemic factors (Turnball 2014).

Scholars have highlighted that despite the complexity of these inequalities (which are social issues requiring a holistic societal-level response), there are ways in which universities may support Indigenous students to complete their studies, thereby increasing equity in tertiary education (Li & Carroll 2017; Hemsley-Brown & Oplatka 2015; Zacharias et al. 2016; Fleming & Grace 2015; Lim 2015). University support generally encompasses three domains: (I) access to university (scholarships for accommodation and/or tuition fees); (II) services and utilities (mentoring, extra-tuition, special consideration); (III) graduation and post-graduation (scholarships and prizes, graduate positions, employment assistance). It is argued that for

Indigenous persons to thrive at university, offered support must incorporate each of these elements in a culturally sensitive and appropriate manner (Bandias, Fuller & Larkin 2014; Barney 2016). The literature also points to the importance of Indigenous epistemologies, knowledges and perspectives being included within tertiary curricula for it to be culturally safe and more holistic for Indigenous (and non-Indigenous) people (see Koukkanen 2007; Nursey-Bray 2019; Kennedy et al. 2019).

There have been mixed reviews on the performance of Australian universities in ameliorating Indigenous access to, and completion of, education. Some research states that Australian universities have improved their focus on assisting Indigenous students to access tertiary education in terms of recruitment initiatives and the provision of scholarships (Anderson 2016), whilst other reports suggest that such measures have been insufficient (Bandias, Fuller & Larkin 2014). Notwithstanding this, the provision of scholarships and bursaries have been shown to reduce recipient anxiety, and thereby improve retention rates (Zacharias et al. 2016). This is particularly pertinent in assisting with accommodation costs given that, as aforementioned, distance and relocation have shown to be a particular barrier for Indigenous students undertaking (and remaining in) their studies (Parker et al. 2016; Asmar, Page & Radloff 2015; Barney 2016). Nevertheless, most Australian universities may not have enabling, and pathway programs tailored for Indigenous students (Turnbull 2014), and of those that do more research is required to evaluate the efficiency and impact of these schemes (Pitmen et al. 2017; Ferrier, Heagney & Long 2008; Whiteford et al. 2017; Eilam et al. 2016).

It has been argued that universities have prioritised student recruitment and enrolment fiscally rather than to provide support for students physically and educationally throughout their studies (Anderson 2016; Liddle 2016; Parissi, Hyde & Southwell 2016). Accordingly, universities must direct more attention to the provision of both psycho-social and tuition support to strengthen student retention and completion rates (Anderson 2016). Measures to integrate students socially within the university, and to ensure students receive support from academic staff, have also been demonstrated as efficacious in reducing student attrition rates (Bennett et al. 2015; Edwards 2015; Li and Carroll 2017; Lim 2015; Sung & Yang 2009; Gibb 2006; Deonandan, Janoudi & Uzun 2017). For Indigenous students in particular, feeling culturally safe and respected, having access to sensitive and non-domineering staff, protection from racism, and access to support are key to retention and success (Gibb 2006; West et al. 2014; Ferrier, Heagney & Long 2008; Carter et al. 2018; Shah & Widin 2010).

Importantly, research has highlighted the need for a harmonised approach between university admissions administration and individual faculties in taking responsibility for/in the recruitment, retention and completion of Indigenous (and other marginalised) persons in their courses, diplomas and degrees (Behrendt et al. 2012). The 2012 Indigenous Higher Education Review advised that the care of Indigenous students should be shared across the university rather than primarily left with Indigenous Student Support Centres. The current model of care ought to be completely reversed, charging faculties and central administration with the duty to be the primary sources of care and support for Indigenous students (Behrendt et al. 2012; Turnbull 2014; Oliver et al. 2015; Kinnane et al. 2014). Australian universities have expressed varying commitments to improving Indigenous enrolment, retention and graduation, and receive not inconsiderable Commonwealth funding for this purpose; however, it is necessary that they follow existing inquiry recommendations to do so (Behrendt et al. 2012; Page, Trudgett & Bodkin-Andrews 2016).

The Study: Method and Results

This study has been conducted to understand the initiatives presently being undertaken by Australian universities' Science faculties to assist in the enrolment, retention and completion of Indigenous people within science courses, as a means of identifying current practices and exemplars. The project was commissioned by the University of Tasmania's College of Sciences and Engineering, with the endorsement of the Australian Council of Deans of Science. Initial planning for the study commenced in August 2018, wherein the nature and scope of the project was formulated with an initial reconnaissance of the literature, and a Research Consultant (Associate Professor Kuit) was appointed to oversee the project. In January 2019 a Project Officer (Dr Guerzoni) was employed to conduct a literature review for the project and to prepare the ethics application and participant surveys. The surveys were independently reviewed by external scholars.²

Two on-line surveys (via Survey Monkey) were created to acquire an understanding of faculty-level support initiatives for Indigenous students, as information at that level of detail is not readily available on university websites:

- Survey A (Dean of Science Survey; Appendix 1): **44** questions covering topics of: (I) recruitment strategies of Indigenous students at their Institution; (II) support related to enrolment of Indigenous students; (III) support related to enrolled Indigenous students; (IV) graduation (awards, alumni networks). Deans were selected as the participants as it was collectively reasoned that they would be most knowledgeable of support initiatives within their College/Faculty/School/Institute.
- Survey B (Student Admissions Survey): **27** questions covering topics of: (I) basic information pertaining to their institution (such as enrolments, size); (II) support related to enrolment of Indigenous students; (III) support related to enrolled Indigenous students; (IV) graduation (numbers). Student Admissions Managers were selected as the participants as they have access to student enrolment data, which would provide an insight into, and assist in the understanding of, the Indigenous initiatives operative at the participant universities (viz. whether presence of initiatives is reflected in size of Indigenous student population).

Survey participants were drawn from the 37 ACDS member institutions. Participants were invited to participate in the survey by e-mail from the Project Officer in June 2019 and, where no response was given, followed up by a subsequent e-mail and telephone call. E-mail addresses were sourced from the ACDS website (for Survey A participants) by a clerical assistant, or from each university's website or by contacting their switchboard (for Survey B participants). Participants were made anonymous.

Whilst ACDS members initially expressed interest in the project, the survey response rate was not high. Only 11 ACDS members completed Survey A and only one Admissions Manager completed Survey B. As only one university completed Survey B the data is not included in this report.

² See Acknowledgements.

Once the survey period had lapsed (June to October 2019), the survey data was downloaded and assembled into a Microsoft Excel spreadsheet for analysis by Guerzoni and Kuit.

Findings

Survey A (Dean of Science Survey) findings are summarised here, sorted thematically by subject area of the survey questionnaire: recruitment and school engagement; enrolment support; bridging programs; course-specific support; scholarships and awards; mentoring; alumni networks and; HDR initiatives. Each is presented in turn.

Recruitment and School Engagement (Survey Questions 7-18)

Survey Questions 7-13 provided insight as to the nature of the initiatives at a faculty level to recruit Indigenous students (viz. targeted age-levels, types of programs, duration, and location), and the degree to which Indigenous staff and community members are involved. Questions 14-17 queried whether community and participant feedback were gathered, as a means of understanding community perceptions and involvement. Question 18 sought to determine whether participants believed that initiatives encouraged Indigenous students to study science at university. The survey scope included asking whether programs were offered by the participant faculties specifically, or by another section of the university (viz. student services).

Six participants indicated that their university and/or faculty engaged in outreach activities designed to encourage Indigenous students to study science (Fig. 1). One participant selected ‘Other’ as their response, but the program described was run by the University’s Indigenous student support centre so could have been counted as being offered at University level.

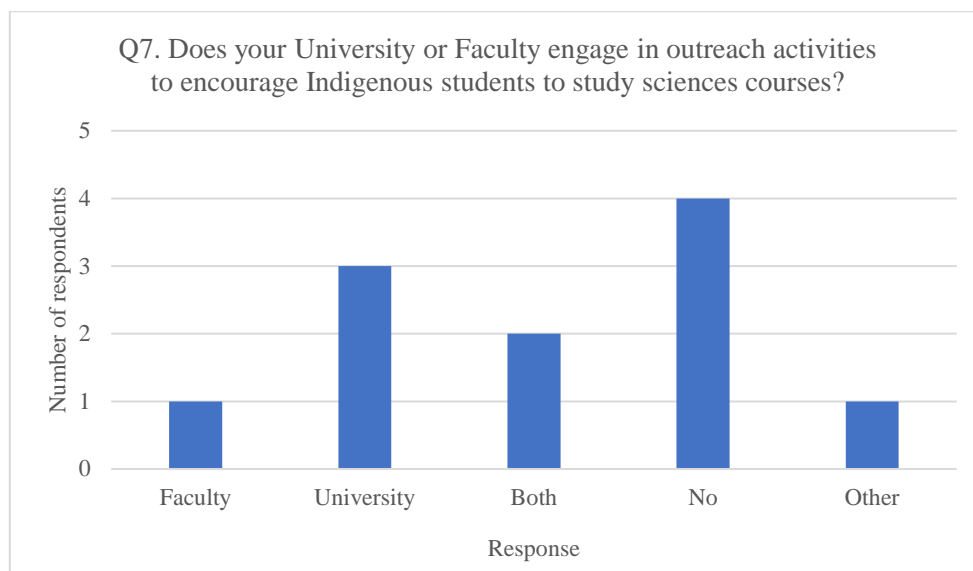


Figure 1. Participant responses to survey question 7.

Survey question 8 invited participants to describe the outreach activities provided by their university or faculty. Some participants described what may be said to be generic university-level programs (information sessions), whilst others described in detail the programs with which their faculty partnered. These activities had a common focus on facilitating the development of leadership skills, literacy and numeracy skills, and cultural identity for Indigenous children. These were run mostly through camps, whilst some entailed visits to schools or bringing school children to the universities to learn about and experience first-hand university life. Only two participants described programs that appeared to be designed for Indigenous students with a specific interest in science, including the running of science experiments and offering experiential sessions under the guidance of Indigenous people in science. Other programs involved mentoring programs for high school students in science, some being run in collaboration with the Australian Indigenous Mentoring Experience (AIME), to assist students succeed at school in order to assist transition into university

Survey questions 9-13 invited participants to provide further detail on the outreach activities described in question 8, including the target audience’s age group(s) and the programs’ staffing composition, location (on or off campus), duration, and frequency. Five participants skipped this set of questions; those who did respond all indicated that the programs were led by their university’s Indigenous student support centre staff and/or other Indigenous staff/students and staff/students who had undertaken Indigenous support/mentor training (Question 10). Most of these programs also shared similarities in targeting Indigenous youth at secondary school level (grades 7-12) (Fig. 2), were a mix of on and off campus (Fig. 3) (one participant even specified that the activities were on country), and were held as regular events (Fig. 4). The duration of the outreach activities described ranged from one hour to a camp held over multiple days.

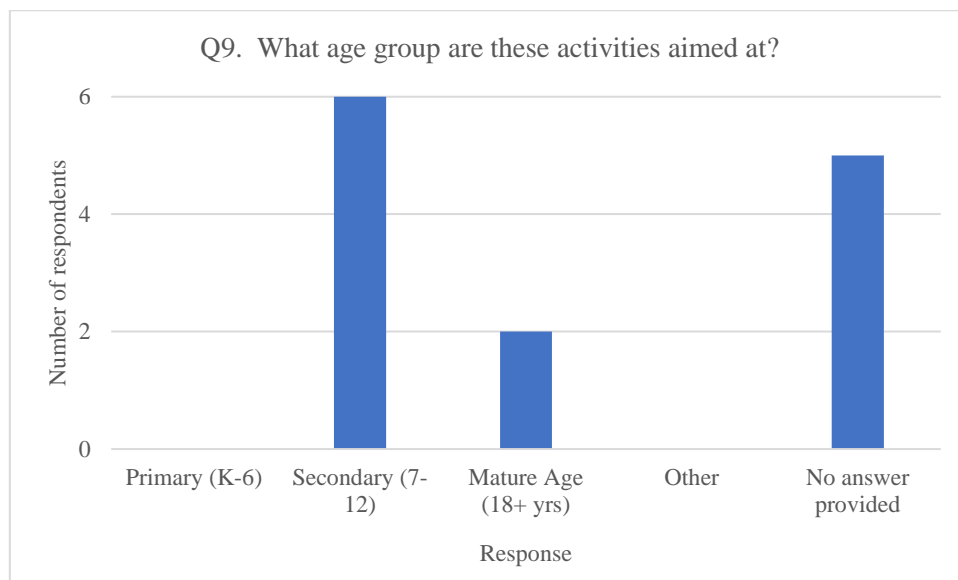


Figure 2. Participant responses to survey question 9.

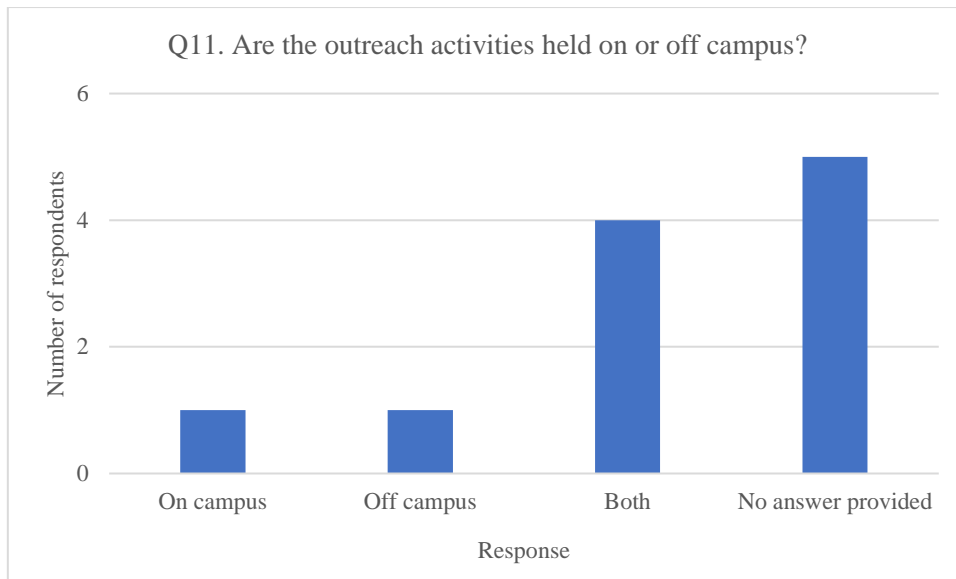


Figure 3. Participant responses to survey question 11.

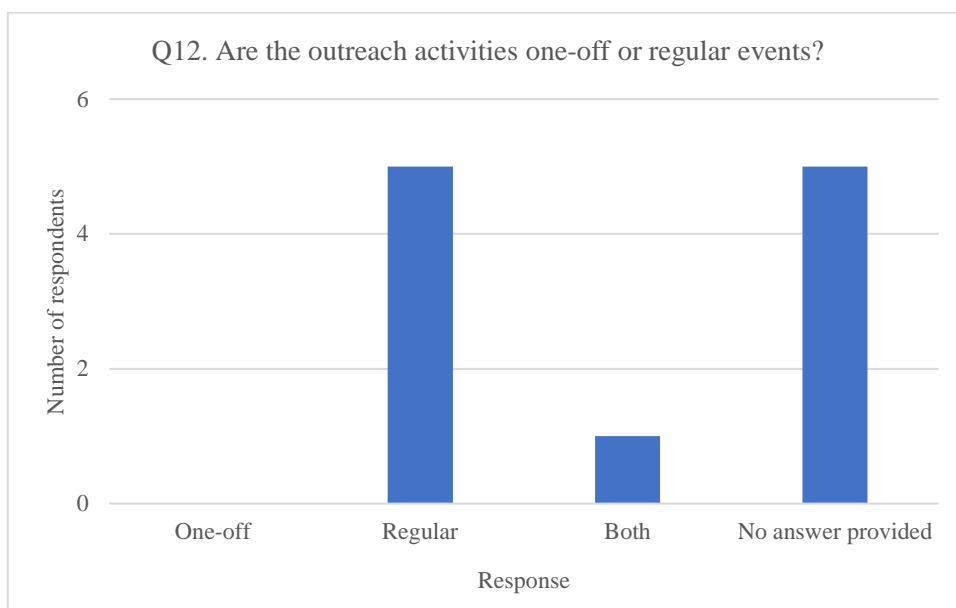


Figure 4. Participant responses to survey question 12.

Survey questions 14-17 asked for comment as to the extent to which Indigenous staff and community were involved in the formation and delivery of the programs. Some institutions had Indigenous involvement, whilst at others, Indigenous staff and community provided evaluation and feedback only. Six participants indicated that the development and operation of the programs were assisted in some way by members of local Indigenous communities. It was not specified whether these programs had direct community involvement or whether involvement took the form of participation of Indigenous personnel from Indigenous

communities.³ Encouragingly, some institutions expressed that their programs included the feedback from persons receiving the service of these programs (youth, parents, guardians) and the Indigenous community more broadly. Given that most of the survey respondents did not appear to play a large role in the operation of the outreach programs, it is understandable that further detail was not provided as to the content of such feedback and the degree to which it shaped the running of these programs. Table 3 summarises the involvement of Indigenous people in these initiatives.

Survey Question	No. of survey participants affirming community involvement
Q14. Do your outreach activities include Indigenous members of the community to develop the program?	6
Q15. Do your outreach activities include Indigenous members of the community to assist in the running of the activities on the day/s?	5
Q16. Does your university or faculty seek feedback from the participants (or parents/guardians) about the outreach activity?	6
Q17. Does your University or faculty seek feedback from Indigenous members of the community about the outreach activity?	3

Table 3. Participant engagement with Indigenous Community, Staff and Parents regarding recruitment initiatives (survey questions 14-17).

The final question of this section, Question 18, queried belief as to recruitment strategy success in drawing Indigenous youth into science courses. There were varying degrees of confidence, with the majority of participants expressing that they were either unsure or choosing not to answer this question (Fig. 5).

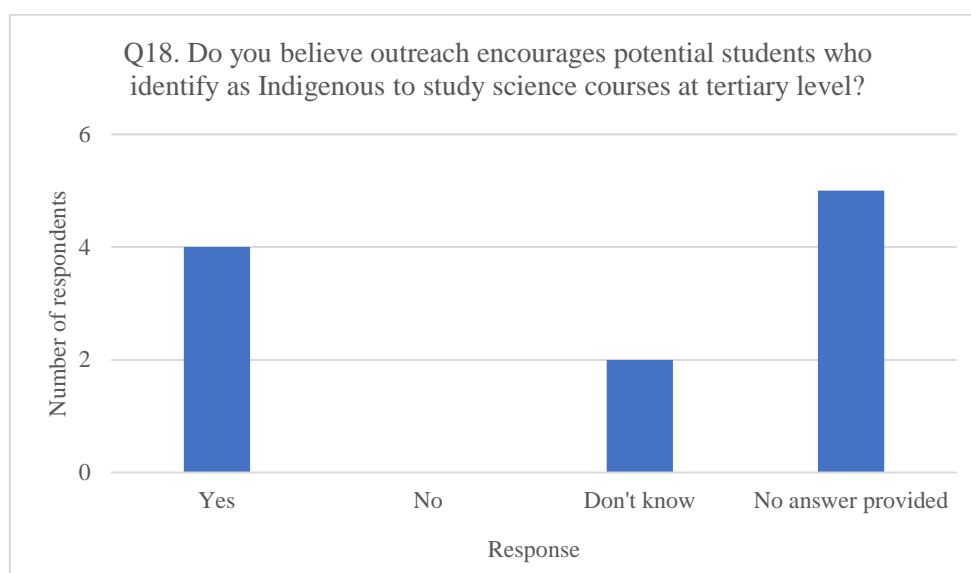


Figure 5. Participant responses to survey question 18.

³ Perhaps this is due more because of the nature of the question which did not request further elaboration and specification.

Support of Enrolment (Survey Questions 19-23)

Questions 19-23 queried as to the enrolment support offered to Indigenous students. Whether these were offered, the nature of this support, and their perceived efficacy are shown in Figs. 6-8.

All except two participants indicated that to some extent Indigenous applicants were offered additional assistance in the enrolment process (Question 19; Fig. 6). One participant indicated that both their faculty and university offered such support (it was noted, however, that subsequent answers from that participant suggested that the support was only offered centrally, through student admissions and/or the university's ISU).

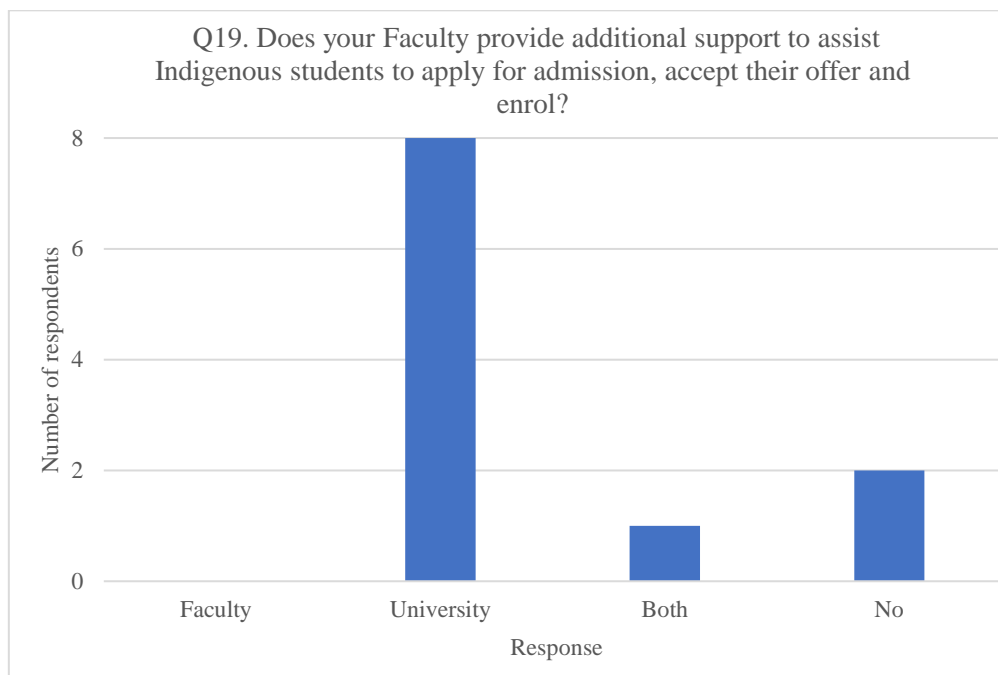


Figure 6. Participant responses to survey question 19.

Question 20 asked participants who had answered yes to Question 19 to describe the type of support offered to Indigenous applicants. Answers provided described the inclusion of assistance with the admission and enrolment processes, active management of applicants to enable pathways to be offered, development of individual learning plans, orientation programs, and, in one instance, provision of Indigenous tutors to support the relationship between the Indigenous students' home and the university. It was largely unknown as to whether Indigenous applicants, in receiving enrolment support, improved their entrance into science courses (Question 21; Fig. 7).

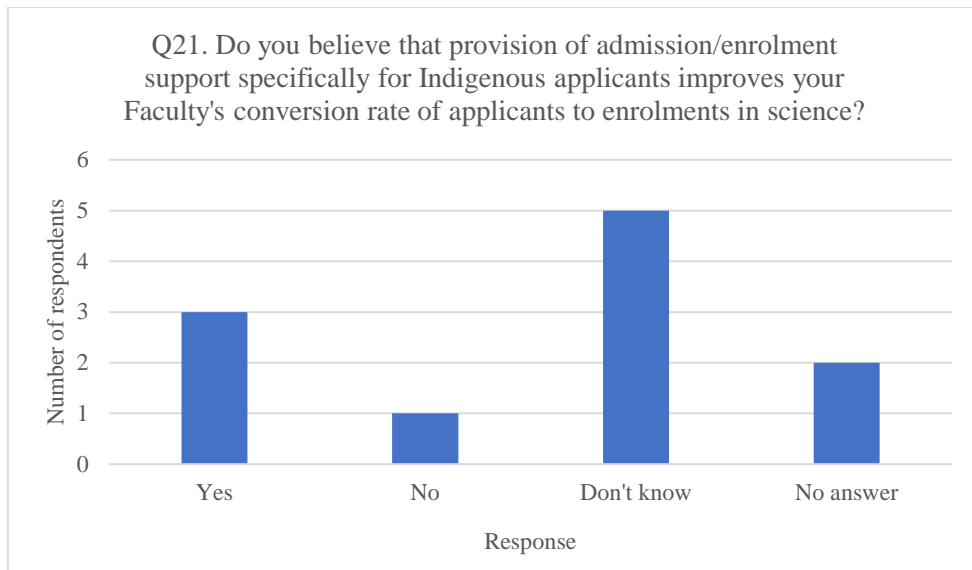


Figure 7. Participant responses to survey question 21.

Question 22 sought to determine whether orientation support designed specifically to meet the needs of Indigenous students before, and during, their first semester of study was available and, if so, to provide a description of that support (Question 23). The responses indicated that, where provided, orientation was managed at the university level by the ISU in face-to-face mode on campus or, in one instance, also online. There was no evidence to indicate that orientation specifically designed to meet the needs of Indigenous students at the faculty level was provided (Fig. 8).

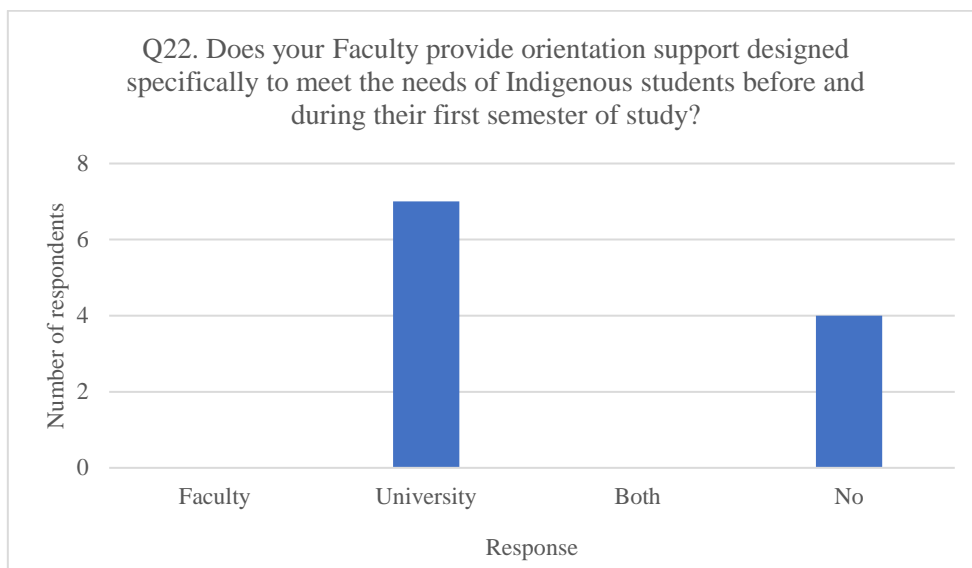


Figure 8. Participant responses to survey question 22.

Bridging Programs (Survey Questions 24-25)

Survey Question 24 inquired whether specialised bridging programs were offered for Indigenous students to ease their entrance into science courses (as is the case for some medical and legal programs). Only three participants indicated that their university had such programs (Fig. 9); however, from the program descriptions provided (Question 25) they appeared to be general programs, to provide academic skills relevant to all university study, rather than pertaining to science specifically. One respondent reported that all subjects covered in their university's specialised bridging program for Indigenous students had an Indigenous focus.

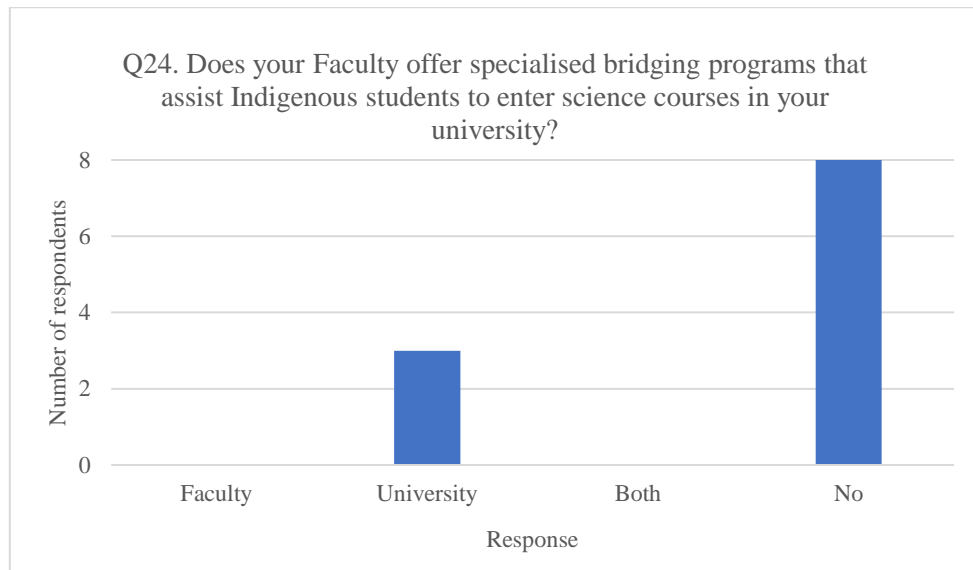


Figure 9. Participant responses to survey question 24.

Course-specific Support (Survey Questions 26-31, 36)

This section formed the second largest focus area of the survey (Questions 26-31 and 36). It was intended as a means of understanding what course-specific support was offered at the faculty level (rather than through the ISU) to Indigenous students, and whether this differed for under-performing students and/or those at risk of withdrawing from or discontinuing their studies.

Question 26 asked participants to identify whether course-specific support for Indigenous students was offered at the faculty or university level, and, if so, to describe that support (Question 27). The clear majority relied upon ISUs and other university tutoring and support services; only one participant indicated that such support was offered at both faculty and university levels (Fig. 10). Question 27 allowed participants to describe the support provided, which was largely similar to the support described as being provided during enrolment (Question 20), in addition to programs to develop study and leadership skills; peer and cultural support; counselling, career and employment advice; tutoring; and financial and accommodation assistance.

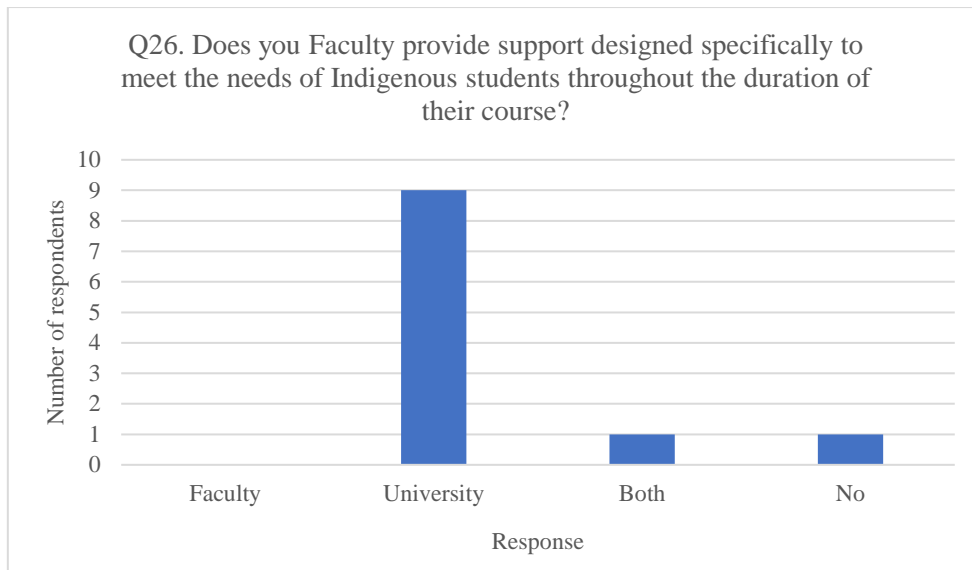


Figure 10. Participant responses to survey question 26.

Indigenous students identified as being at risk of withdrawing from, or failing, their courses (Question 28) were also offered support, either by the faculty, the university or both (Fig. 11). The descriptions of the support provided (Question 29) did not largely differ from the answers provided in Question 27. One participant, however, described a specialist program that they offered within their faculty for Indigenous students at risk, which included access to an Indigenous tuition scheme, on-line resources and having their course progress monitored to assist completion. Students reportedly sign a work ethic contract, a series of resolutions to be shown to students who are considering un-enrolment in order to encourage persistence and completion of their degree, alongside an on-line-question and answer platform.

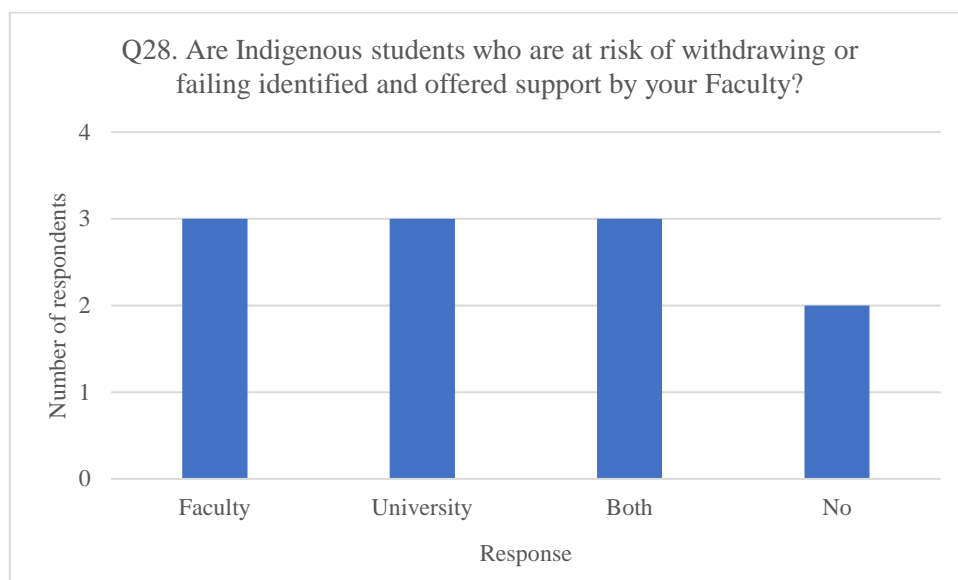


Figure 11. Participant responses to survey question 28.

Question 30 sought to identify whether the support provided to Indigenous students identified as being at risk differed from that provided to non-Indigenous students. Four participants indicated that the support for Indigenous students did differ (Fig. 12). It was described (Question 31) as being through the provision of scholarships; funding for development opportunities or if facing hardship; one-on-one academic support; and access to specialist programs that included Indigenous support staff, students, tutors, and space.

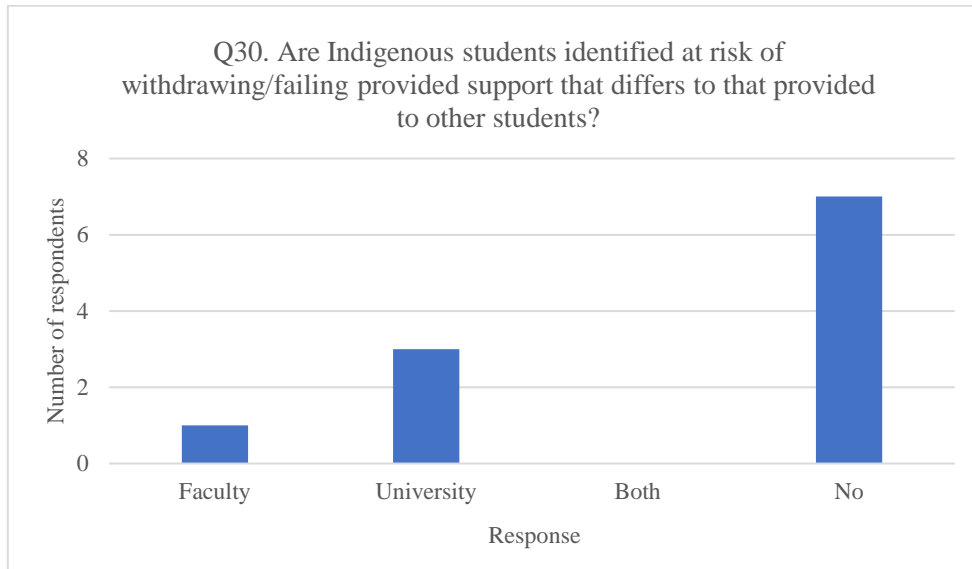


Figure 12. Participant responses to survey question 30.

The majority of survey participants were of the opinion that Indigenous-specific support assisted their Indigenous students to complete their tertiary tuition (Fig. 13).

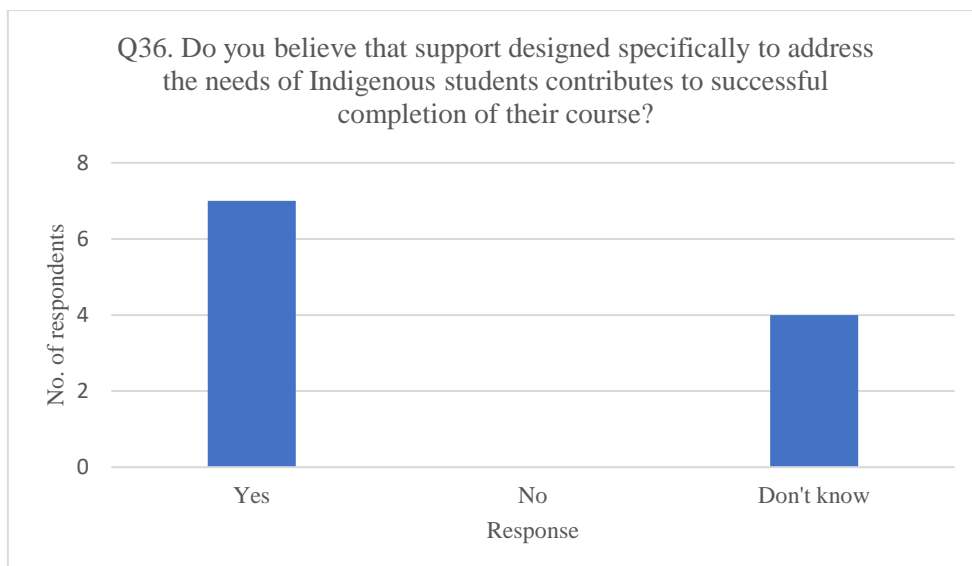


Figure 13. Participant responses to survey question 36.

Scholarships and Awards (Survey Questions 32-33, 37, 41)

Two survey questions asked as to the offering of financial support (scholarships and bursaries) specific for Indigenous students (Questions 32-33), and two questions asked as to the provision of awards (Questions 37 and 41).

Four participants indicated that they offered Indigenous scholarships only at the University level (suggesting Commonwealth-funded scholarships) and four at both the faculty and university levels (Fig. 14). Faculty-level scholarships were typically described as being cohort-specific (e.g., for Engineering, ICT, or STEM students) and provided for the purpose of assisting with the students' tuition fees, accommodation costs, and/or unexpected expenses. The value of the scholarships described ranged from \$1,000 to \$5,000.

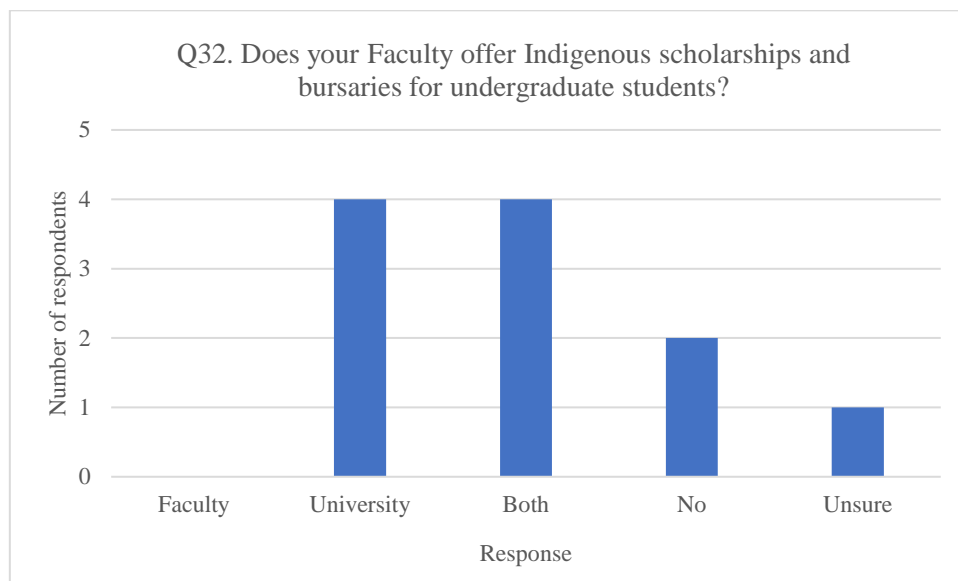


Figure 14. Participant responses to survey question 32.

Recognition of Indigenous science students' successes did not appear to be widespread, with the majority of participants indicating that they did not present awards specifically designed to recognise high-achieving Indigenous graduates. Those who did present awards for this purpose largely did so only at the university level. One participant indicated that they presented awards to Indigenous science graduates at both the university and faculty levels (Fig. 15).

Despite the apparent lack of awards to recognise high-achieving Indigenous science graduates the overwhelming majority of participants surveyed indicated that they did believe such recognition, and celebrating Indigenous students' successes, encouraged other Indigenous students to study science at university (Fig. 16).

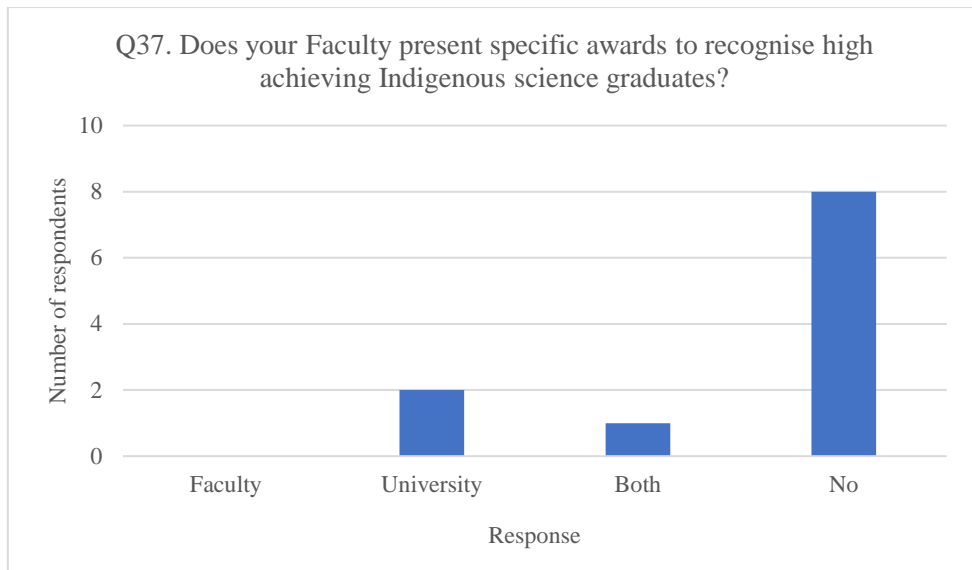


Figure 15. Participant responses to survey question 37.

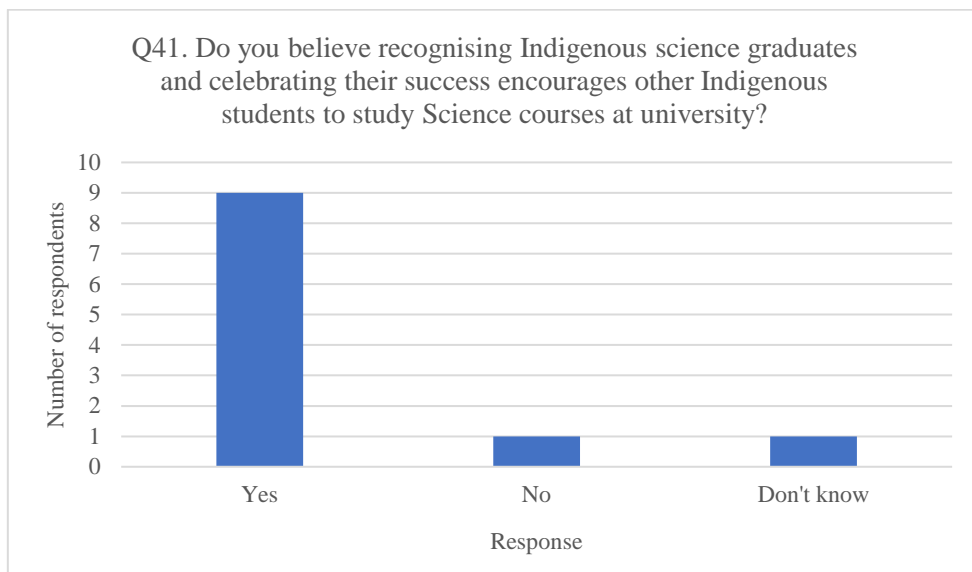


Figure 16. Participant responses to survey question 41.

Mentoring (Survey Questions 34-35)

Survey Questions 34 and 35 inquired as to the nature of the mentoring and tutorial programs offered at the participant universities for Indigenous students. Whilst there were a number of programs operative, the majority of these were offered only at the university-wide level, via the university's ISU (Fig. 17).

One survey participant indicated that their university offered a mentoring program only at the faculty level; however, the information about that program, provided by the participant in response to Question 35, described it as being part of their university's enrolment support program overall. Another participant also indicated that their faculty has an 'Indigenous Coordinator' who provides Indigenous students with support and mentoring.

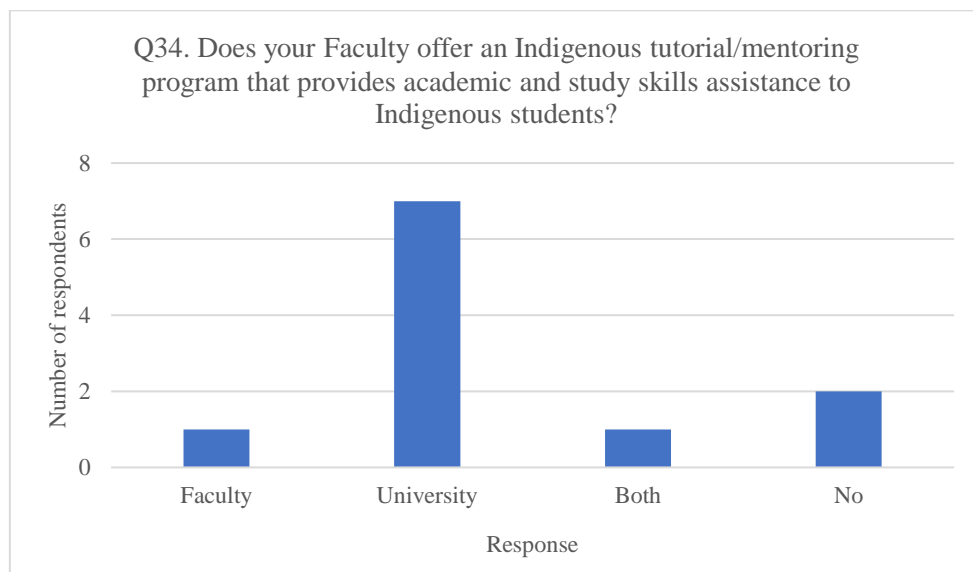


Figure 17. Participant responses to survey question 34.

Alumni Networks (Survey Questions 38-40)

Survey Questions 38-40 inquired as to the existence of Indigenous alumni networks.

Question 38 sought to identify whether Indigenous science graduates were provided with an alumni network. Nine participants reported that these operated at their institution at the university-wide level and were not necessarily for Indigenous graduates specifically. Two participants answered 'No' to this question (Fig. 18).

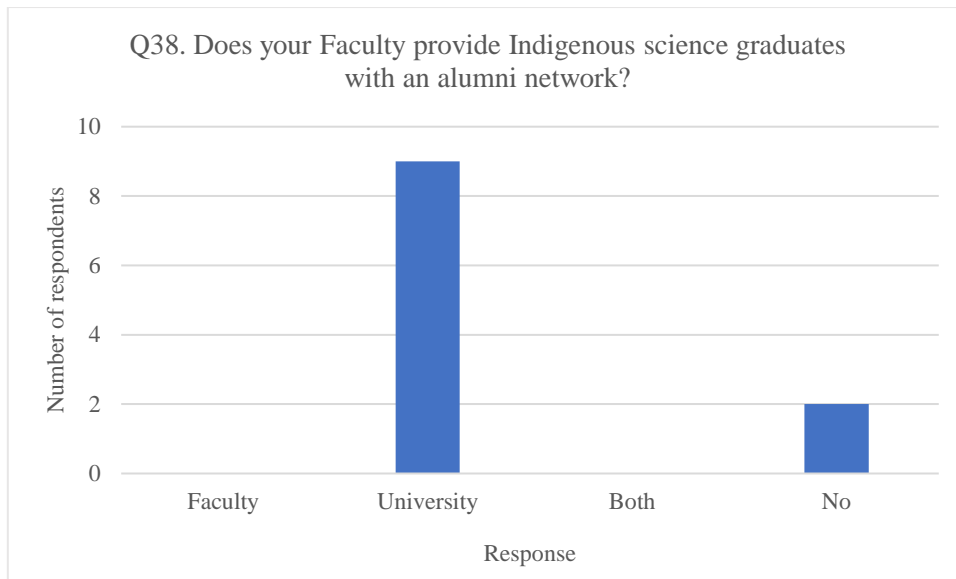


Figure 18. Participant responses to survey question 38.

Five participants reported that they encouraged their Indigenous science graduates to become members of mentoring/support networks for potential Indigenous science students and these operated at the University wide level (Fig. 19).

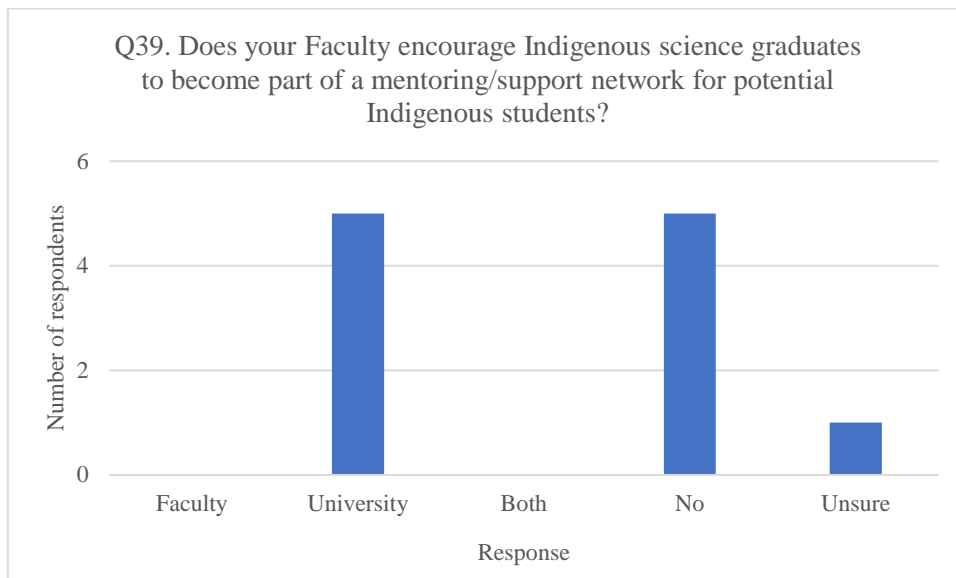


Figure 19. Participant responses to survey question 39.

The mentoring/support networks subsequently described (Question 40) ranged from being ad hoc in nature (i.e., if and when the opportunity arose) to formal programs. The latter included mentoring programs run at the university-wide level every semester and Indigenous alumni being hired as mentors and student ambassadors.

Higher Degree by Research (Survey Questions 42-43)

Survey question 42 asked participants whether their faculty encouraged Indigenous science graduates to pursue higher degree by research (HDR) pathways. All except three participants reported that their Indigenous science graduates were encouraged by either the faculty or both the faculty and the university to consider HDR options (Fig. 20). One participant reported that their Indigenous graduates were encouraged to the same extent as all students.

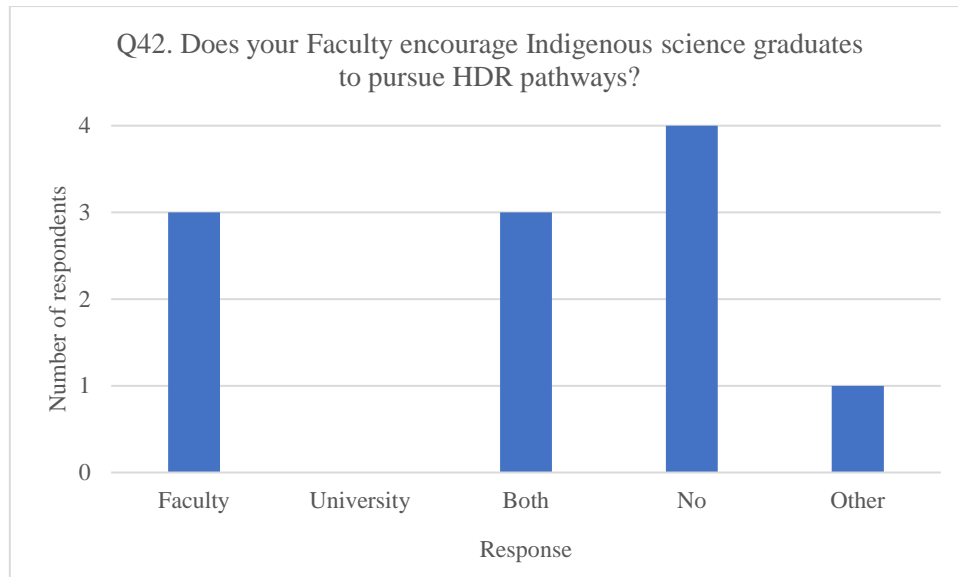


Figure 20. Participant responses to survey question 42.

When asked as to what initiatives (scholarships and bursaries) were offered to enable Indigenous graduates to pursue HDR programs (Question 43) five participants reported that their science faculties offered no specific financial support for Indigenous HDR candidates (included in this category is one participant who did not think their faculty offered financial support). The other six participants indicated that such financial support was offered centrally.

Miscellaneous (Survey Questions 6, 44)

Two survey questions were standalone items that sought to capture the level of commitment of science faculties to Indigenous students' welfare through the presence of a specific 'Indigenous Support Officer' (Question 6) and the perceived efficacy of the faculties' initiatives for Indigenous students contributing to their course completion (Question 44).

Interestingly, and encouragingly, four participants indicated that their university had Indigenous Support Officers employed at the faculty level (Fig. 21). Optimism was also expressed overall as to the transference of Indigenous support initiatives to Indigenous completion rates, with seven of the 11 participants responding positively to Question 44 (Fig. 22).

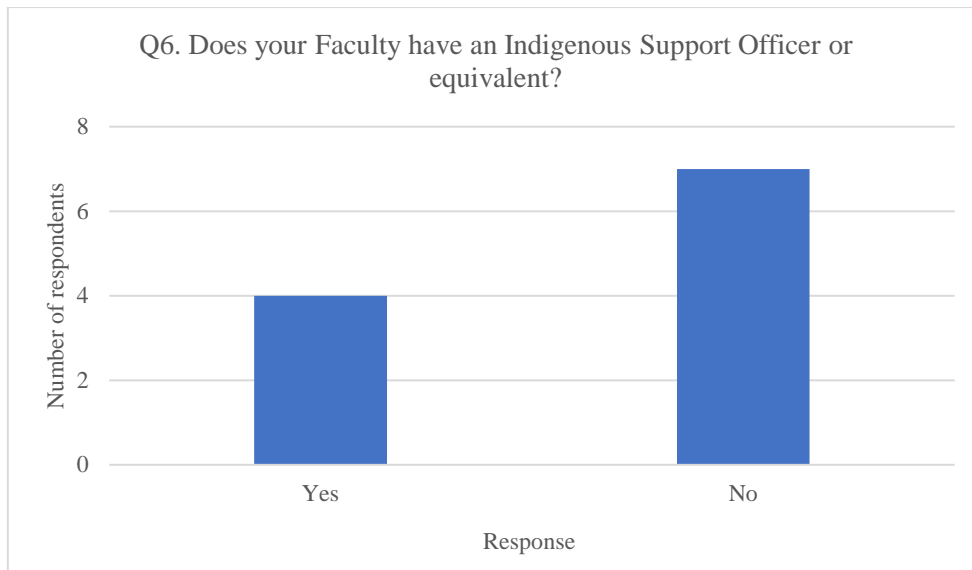


Figure 21. Participant responses to survey question 6.

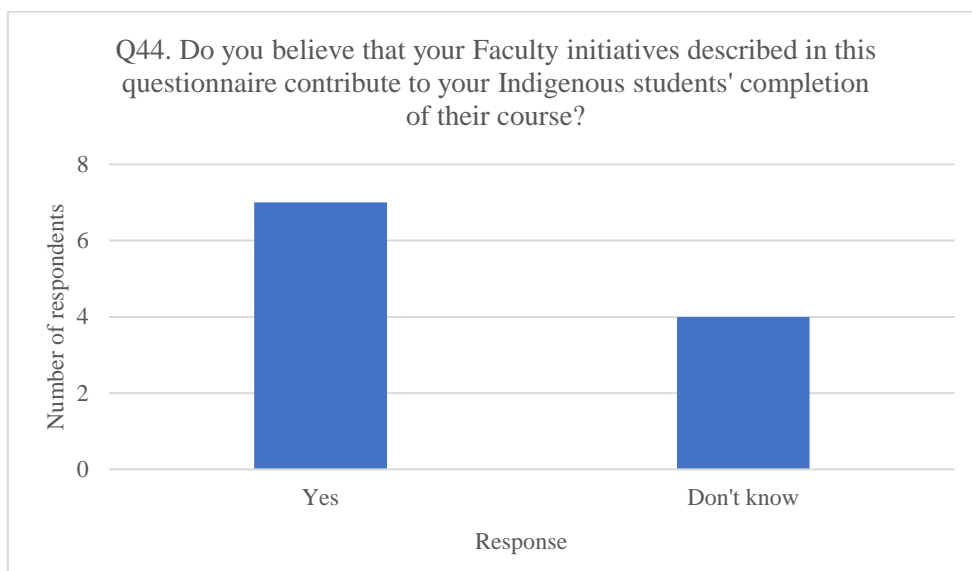


Figure 22. Participant responses to survey question 44.

Discussion

The survey results indicate that of the 11 faculties sampled, the majority tend to rely on initiatives managed at the university-level and/or through their university's ISU, rather than operating initiatives specifically at the faculty level. This suggests that, at present, faculties (and indeed universities at a governance level) still perceive the engagement and support of Indigenous students to be the role of other specialist university departments rather than a systematic partnership at each level of the university. This perception, though recognised as a product of the bureaucratic structuring and functioning of universities (i.e. specialisation and an intention to prevent duplication of offered services) and the neglect of Indigenous people (Walter 2012) in Australian universities, requires prompt addressing.

From each of the surveyed areas, the data suggest that science faculties tend to be most involved with the support of Indigenous youth at the recruitment stage. Three institutions described in detail in their survey response the offering of engagement and mentoring initiatives being run with secondary schools within their state. These programs tend to be either experiential (i.e., students visit the university and observe science in action or have the university bring the science to the school) or mentoring focussed (i.e., university students assisting secondary students in science). Importantly, these programs involve Indigenous staff, students and community members in their planning and execution, which is vital for continued Indigenous engagement. Encouragingly, it was reported that community assistance was available for a number of university programs. It can be said that the initiatives at these universities seemingly demonstrate how engagement programs may be run as a collaborative endeavour between science faculties and ISUs. Other programs described were culturally focussed, which is beneficial and enriching for Indigenous youth, but demonstrate an absence of involvement by science faculties and staff (which is the main focus of our inquiry).

In areas of enrolment assistance, graduation, scholarships, awards and HDR pathways, it was normative for Indigenous students to receive service from either the ISU or under the portfolio of other areas of the university (for instance, graduations and student admissions). Scholarships are mostly centrally funded, likely through Commonwealth grants, rather than via the individual science faculty (though four institutions do offer these). One university also indicated that they offer scholarships at the faculty level to Indigenous HDR candidates.

The survey results suggest that HDR pathways for Indigenous students do not differ from those offered to non-Indigenous students. Several institutions have established alumni networks for their Indigenous students whereby graduates are recruited to serve as mentors for current Indigenous students.

In terms of the tuition and personal support offered by the survey respondents, and as with the other cases above, ISUs or general support staff, are cited as being responsible for the care of Indigenous students. One university reported that they also have Student Support Advisors in all of their university's faculties. Indigenous Support Units are also responsible for pursuing tutors (under ITAS schemes) and other support services for Indigenous students. Whilst these support centres are great anchors and enablers for Indigenous students it suggests that, at a faculty-level, Indigenous students tend to be seen as a responsibility of an ISU (and therefore likely referred on) rather than assisted directly. This is problematic and must be addressed. Indigenous Support Units may not have the resources or understanding to assist the Indigenous science student, and this contributes further to the overburdening of what are already busy centres of the university (see Trudgett 2009).

Overall, whilst we appreciate that universities and science faculties are beginning to recognise their role in supporting Indigenous Australians, and they are commencing to implement measures to facilitate reform, it is essential that institutions translate verbalised affirmations and commitments into action agreements. These action agreements require on-going support at a governance level to ensure and safeguard a permanent place on the agenda, and the due allocation of resources, to guarantee continuation and long-term implementation. The degree to which science faculties are involved in the early engagement, recruitment, enrolment support, retention and graduation of Indigenous students may differ across the target areas (for instance, there could be a greater focus on the provision of enrolment support

rather than on recruitment) and between institutions (due to campus positioning, size of the faculty, etc.). It is, nevertheless, imperative that initiatives and programs for Indigenous students are formulated and implemented by science faculties across each of these domains to help. This echoes the findings of Behrendt et al. (2012: xii) and it will necessitate conversation with ISUs and consultation with local Indigenous community members.

Recommendations

Recommendation 1

That each member of the ACDS ensures resources are made available for faculty-based Indigenous student support initiatives for science students, and that these resources are installed within the next calendar year. Resources should include course-specific tutoring across the sciences offered at the respective faculty, available across each of the years of the degree. Tutors could be drawn from HDR candidates or Indigenous science graduates.

Recommendation 2

That each member of the ACDS implements enabling pathway programs for Indigenous students into science courses (see Pitman et al. 2017). This will assist those who may have interest in and passion for the sciences, but did not acquire the required entrance score for a university course, to be transitioned into their desired field of university study.

Recommendation 3

That representatives from each member of ACDS consult their ISU and consider approaching local Indigenous communities to acquire insight on what support and services the communities believe should be offered to Indigenous students at the faculty-level.

Recommendation 4

That the ACDS considers commissioning a nation-wide research project to investigate how Indigenous graduates perceived their student experience in the sciences, the support services which they received from both the faculty and the university more broadly, and seeks their feedback as to initiatives they believe would encourage Indigenous Australians to study sciences at the tertiary level. This could readily be undertaken as a survey and issued to graduates (existing and upcoming).

Recommendation 5

That each member of the ACDS formulates means of being involved in the development of engagement strategies with Indigenous people. It could be useful to consult with their campus' ISU in this process.

Recommendation 6

That each member of the ACDS considers funding faculty-specific science scholarships and bursaries for Indigenous students at an undergraduate and postgraduate level.

Recommendation 7

That each member of the ACDS considers funding Indigenous Fellowships for academics in training, providing opportunity to have teaching and research mentoring and movement towards a tenure-track position. Such initiatives are already operative across a number of Australian universities to assist in the provision of equity to Indigenous people.

Limitations

We recognise and acknowledge that there are a number of limitations to this report. Firstly, the sample size reported on here is somewhat small, consequent to the limited uptake amongst invited participants. Related to this is the differing quantity (and quality) of information offered by different participants in their submissions, which in part is linked to the nature of the strategies offered at their institution. Collectively, this limits the ability to offer in-depth comment on the data, both individually and comparatively. This project is also limited as it does not acquire the perspective of Indigenous communities on the work of the universities, nor from those Indigenous persons who are employed within the Indigenous Support units at the sampled universities. It is necessary that future work inquire as to and catalogue these perspectives.

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Appendix 1 – Survey Questionnaire

Part A: Dean or Dean's Representative Survey

1. I have read the Participant Information Sheet (PIS) and hereby give my informed consent to the project group utilising my responses to this survey as outlined in the PIS.

Yes (Please proceed with the survey)

No (Please discontinue the survey)

2. Which Australian university are you representing when completing this questionnaire?

3. What Faculty/College/School (or equivalent) at your University are you representing when completing this questionnaire?

4. What is your position and/or title at your University?

5. Which science disciplines does your Faculty/College/School (or equivalent) cover in its teaching and/or research activities? Tick all that apply.

Physical sciences
Chemical sciences
Earth sciences
Biological sciences
Other (please specify)

6. Does your Faculty/College/School (or equivalent) have an Indigenous Support Officer or equivalent?

Yes

No

Other (please specify)

7. Does your university or Faculty/College/School/Institute engage in outreach activities that seek specifically to encourage Indigenous students to study Science courses?

Yes – Central University administered programs

Yes – Faculty/College/School (or equivalent) administered programs

Yes – both Central University and Faculty/College/School (or equivalent) administered programs

No (please go to question 19)

Other (please specify)

8. If yes, please name and briefly describe your offered program(s).

9. What age groups are these activities aimed at?

Primary School (years K-6)

Secondary School (years 7-12)

Mature age (18+ years of age)

Other (please specify)

10. Who leads these activities?

Indigenous Student Support Centre (or equivalent) staff

Other staff and/or students at your university who identify as Indigenous

Other staff and/or students at your university who have undertaken Indigenous support/mentor training

Other (please specify)

11. Are the outreach activities held on or off campus?

On campus
Off campus
Other (please specify)

12. Are the outreach activities one-off or regular events?

One-off
Regular
Other (please specify)

13. What is the average duration of the outreach activities?

1 hour
Half day (2-4 hours)
Full day
Multiple days
Other (please specify)

14. Do your outreach activities seek input from Indigenous members of the community to develop the content?

Yes
No
Other (please specify)

15. Do your outreach activities include Indigenous members of the community to assist in the running of the activities on the day/s?

Yes
No
Other (please specify)

16. Does your university or Faculty/College/School (or equivalent) seek feedback from the participants (or their parents/guardians) about the outreach activity?

Yes
No
Other (please specify)

17. Does your University or Faculty/College/School (or equivalent) seek feedback from Indigenous members of the community about the outreach activity?

Yes
No
Other (please specify)

18. Do you believe the outreach encourage potential students who identify as Indigenous to study Science courses at the tertiary level?

Yes
No
I don't know

19. Does your Faculty/College/School (or equivalent) provide additional support to assist Indigenous students to apply for admission, accept their offer and enrol? (By 'additional support' we mean support in addition to that offered to non-Indigenous students).

- Yes - at the University wide level only
- Yes - at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 22)
- Other (please specify)

20. Please describe the support offered for Indigenous applicants.

21. Do you believe that the provision of admissions and enrolment support specifically designed to meet the needs of Indigenous applicants improve your Faculty/College/School's (or equivalent) conversion rate of applicants to enrolments in Science courses?

- Yes
- No
- I don't know

22. Does your Faculty/College/School (or equivalent) provide orientation support designed specifically to meet the needs of Indigenous students before and during their first semester of study?

- Yes – at the University wide level only
- Yes – at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 24)
- Other (please specify)

23. Please describe the support provided.

24. Does your Faculty/College/School (or equivalent) offer specialised bridging programs that assist Indigenous students to enter science courses in your university? (for example Pathway Diplomas or Certificates). By 'specialised' we mean offered to Indigenous students only.

- Yes - at the University wide level only
- Yes - at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 26)
- Other (please specify)

25. If yes, please name and briefly describe the bridging programmes offered.

26. Does your Faculty/College/School (or equivalent) provide support designed specifically to meet the needs of Indigenous students throughout the duration of their course?

- Yes – at the University wide level only
- Yes – at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 28)
- Other (please specify)

27. Please describe the support provided.

28. Are Indigenous students who are at risk of withdrawing, or failing, identified and offered support by your Faculty/College/School (or equivalent)?

- Yes – at the University wide level only
- Yes – at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 30)
- Other (please specify)

29. Please describe the support provided.

30. Are Indigenous students identified as being at risk of withdrawing or failing provided with support that differs to that provided to other domestic students?

- Yes – at the University level only
- Yes – at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 32)
- Other (please specify)

31. Please describe how this support differs.

32. Does your Faculty/College/School (or equivalent) offer Indigenous scholarships and bursaries for undergraduate students (e.g., Indigenous scholarships)?

- Yes – at the University level only
- Yes – at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 34)
- Other (please specify)

33. Please describe the financial support offered to Indigenous Students and comment if anything is specifically available for Indigenous students enrolled in Science courses/programmes (of all levels).

34. Does your Faculty/College/School (or equivalent) offer an Indigenous tutorial/mentoring program that provides academic and study skills assistance to Indigenous students?

- Yes – at the University level only
- Yes – at the Faculty/College/School (or equivalent) level only
- Both of the above
- No (please go to question 36)
- Other (please specify)

35. Please describe the Indigenous tutorial/mentoring program.

36. Do you believe that support designed specifically to address the needs of Indigenous students contributes to successful completion of their course?

- Yes
- No
- I don't know

37. Does your Faculty/College/School (or equivalent) present specific awards to recognise high-achieving Indigenous Science graduates?

- Yes - at the University level only

Yes - at the Faculty/College/School (or equivalent) level only
Both of the above
No Other (please specify)

38. Does your Faculty/College/School (or equivalent) provide Indigenous Science graduates with an alumni network?

Yes - at the University level only
Yes - at the Faculty/College/School (or equivalent) level only
Both of the above
No Other (please specify)

39. Does your Faculty/College/School (or equivalent) encourage Indigenous science graduates to become part of a mentoring/support network for potential Indigenous students?

Yes - at the University level only
Yes - at the Faculty/College/School (or equivalent) level only
Both of the above
No (please go to question 41)
Other (please specify)

40. Please describe the mentoring/support network.

41. Do you believe recognising Indigenous Science graduates and celebrating their success encourages other Indigenous students to study Science courses at university?

Yes
No
I don't know

42. Does your Faculty/College/School (or equivalent) encourage Indigenous Science graduates to pursue Higher Degree Research pathways?

Yes - at the University level only
Yes - at the Faculty/College/School (or equivalent) level only
Both of the above
No
Other (please specify)

43. Does your Faculty/College/School (or equivalent) offer Indigenous scholarships and bursaries for students to pursue Higher Degree Research pathways?

Yes - at the University level only
Yes - at the Faculty/College/School (or equivalent) level only
Both of the above
No
Other (please specify)

44. Do you believe that your Faculty/College/School (or equivalent) initiatives described in this questionnaire contribute to your Indigenous students' completion of their course?

Yes
No
I don't know