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Spending for success: identifying 'what works?' for Indigenous student outcomes in Australian Universities

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Research Article

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Abstract

Despite the continued investment in Indigenous support networks and dedicated education units within universities, levels of key performance indicators for Indigenous students—access, participation, success and completion (attainment)—remain below that of the overall domestic student population in most institutions. It remains important to determine what works to achieve Indigenous student success in higher education. This paper proposes that such methods have an integral role to play in providing a holistic view of Indigenous participation and success at university, and are particularly useful in the development and evaluation of strategies and programs. This project found no quantitative correlation between financial investment and success rate for Indigenous students. A negative correlation between access rate and success rate suggests that factors other than those that encourage participation are important in supporting successful outcomes. Those universities that have high success rates have a suite of programs to support Indigenous students, but it is not immediately clear which of these strategies and programs may be most effective to facilitate Indigenous student success rates. In this discussion, we suggest that a multi-layered determinants model is a useful way to conceptualise the many factors that may impact on student success, and how they might intersect.

The authors acknowledge, give thanks and pay respects to, First Nations peoples and Elders current and emerging in Australia and across the Globe. We particularly thank the Kaurna people—original inhabitants and custodians of the Adelaide Plains on which we are privileged to raise our children, work, live and learn.

Introduction

Despite steady increases in Indigenous student access and participation between 2008 and 2017 (McGagh *et al.* 2016; Department of Education and Training, 2016), Indigenous students are still drastically underrepresented at most Australian universities when compared to state and national population parity. Disparity in participation and completion levels in Australia are also similar to examples from overseas, for example, Canada where Indigenous people represent approximately 4.3% of the total population; in 2006, only 8% had successfully completed a university degree compared to 23% of the non-Indigenous population (Gallop and Bastien, 2016; Pidgeon, 2016). Although the numbers are more encouraging in New Zealand where the proportion of Maori with a bachelor's degree or higher increased from 4.5% in 2002 to 7.9% in 2012, Maori comprised 15.6% of the population in 2013 (New Zealand Ministry of Health/Manatu Hauora, 2018; Theodore *et al.* 2016) and these numbers are still lower than the non-Indigenous population; postgraduate participation and completion is low across all three examples.

As access and participation figures have increased in Australia, so too has investment and program funding by the federal government, and by universities themselves. However, despite encouraging increases, Indigenous student numbers are still significantly below the Indigenous population parity of 3%. In 2016, Indigenous students represented approximately 1.7% of domestic university students nationally (Australian Federal Government, 2017b).

Further, although access and participation rates have increased, the outcomes of success and completion rates remain relatively low when compared to the national 'mainstream' student body, and with other 'equity groups' (Australian Federal Government, 2017b). The Behrendt *et al.* (2012) Higher Education Review highlighted a need to shift away from a focus on access, towards successful educational outcomes.

The funding metrics of the Australian Government's transition from the Indigenous Support Program (ISP) to the Indigenous Student Success Program (ISSP) policy in January 2017 reflects this and applies a greater weighting to progress and outcome indicators such as success and completions (Australian Federal Government, 2017b).

Despite the increased availability of funds specifically targeting programs for Indigenous students, success rates generally remain significantly below not only the non-Indigenous mainstream student body, but other equity student groups both nationally, and within most universities (Australian Federal Government, 2017b).

For example, the national Indigenous student success rate for 2015 was 74%, while the corresponding rate for students with a disability 81%, students from a non-English speaking background 85% and for mainstream students 87% (Australian Federal Government, 2017b).

Factors that may impact on student success

In the Canadian context, Gallop and Bastien (2016, p. 1) assert that historically the term 'success' for Aboriginal peoples was linked to assimilation, as a 'complete adaptation to the mainstream values and behaviours of the postsecondary institutions' was required to be successful. In the context of this study, 'success rate' is a statistical concept used at the institutional level. Australian research into Indigenous student success is often qualitative, reflecting on personal and educational experiences that may impact on an individual's ability to wholly devote themselves to their university studies. Such research is vital, and papers from authors such as Anderson and Reich (2017), Barney (2013, 2016), Devlin (2009) and Rochecouste *et al.* (2016) provide key literature and interview data from Indigenous higher education students and staff around the country. Aboriginal and Torres Strait Islander cultures and students are not a homogenous group, and access and success strategies must be locally contextualised.

As with all new university students, Indigenous students need to develop many skills in their pursuit of higher education. Therefore, it is likely that *all* Indigenous students will require a high level of personal resilience (Devlin, 2009) to ultimately negotiate the 'cultural interface' of the university (Martin and Kipling, 2006; Rochecouste *et al.*, 2016). Many Indigenous students face an 'intersectionality' (Nakata, 2007; Martin and Kipling 2006) of challenges, including cultural, literacy and numeracy factors that may impact on their success in higher education. Such challenges may significantly reduce the student's ability or desire to connect and identify with the university, reducing their success, and potentially leading to withdrawal from the study.

International studies can also provide insight into factors that contribute to success for Indigenous students. For example, Gallop and Bastien (2016 p. 210) cite Pidgeon's assertion that 'programs that support strong cultural identity can lead to "cultural integrity"'. Aside from the academic readiness of the students, they highlight the importance of an Aboriginal student centre in the provision of cultural, social and academic support in the retention of Aboriginal students and point to the importance of role models and mentors (Gallop and Bastien, 2016, pp. 210–211).

Martin and Kipling (2006) particularly highlight the impact that inadequate funding has on an individual's ability to concentrate on learning, and ultimately to succeed. Indigenous Education Centres (IECs) provide support to Indigenous students, and often act as the conduit between Indigenous staff, the Indigenous student body, Indigenous community and senior decision makers within the university (IES statements; Department of Education and Training, 2017a; Barney, 2013). It is generally the responsibility of these units to recruit and support Indigenous students, and to report Indigenous student numbers and outcomes through the compilation and submission of IES statements.

Student support is offered by universities in a plethora of ways. Many employ student support officers within Faculties and IECs. IEC costs, such as support staff salaries, support strategies, and inclusion and outreach programs appear to be the primary cost in which ISP and non-ISP funds are spent by universities.

Pechenkina *et al.* (2011) present research demonstrating an association between elements of student support via a 'student support score' between 1 and 5, and university completion rates for Indigenous students. Their research found moderately statistically significant correlations between student centre 'score' and Indigenous completion rate, and strong correlations between the number of support centre staff and Indigenous student commencement number (Pechenkina *et al.*, 2011). As with this project, they utilised quantitative data available from the Australian Federal Government (DEEWR now DET), and available online from universities.

University funding for Indigenous outcomes

The Department of the Prime Minister and Cabinet (PM&C) requires universities who receive funding through the ISP (now ISSP) to provide information relating to their responsibilities under the National Aboriginal and Torres Strait Islander Education Policy through Indigenous Education Statement (IES) documents. There are three conditions of eligibility for ISSP; through their IES documents, 'table A' Universities must demonstrate to PM&C that they:

- Have implemented strategies for improving access, participation, retention and success of Aboriginal and Torres Strait Islander students;
- Have increased participation of Aboriginal and Torres Strait Islander peoples in the university's decision-making processes; and
- Have an Aboriginal and Torres Strait Islander employment strategy.

(Department of Education and Training, 2017a)

Specifically, through IES, universities are required to detail those programs and strategies that facilitate Indigenous:

(1) Participation in decision making;
(2) Employment;
(3) Equitable access to Aboriginal and Torres Strait Islander students to higher education;
(4) Participation of students at similar rates to all other Australians;
(5) Enable Aboriginal and Torres Strait Islander students to graduate at the same rate as other;
(6) Australians; and/or Provide all Australian students with an understanding of, and respect for Aboriginal and Torres Strait Islander traditional and contemporary cultures.

IES documents are a potentially rich source of data regarding Indigenous strategies and programs, although the depth of information may vary between universities. Further, they detail expenditure of funding received by universities from the ISP in the preceding year and provide an opportunity to delineate further 'non-ISP' investments made by universities. Details often include spending on IEC and Indigenous Research Unit (IRU) infrastructure, programs and strategies, and the number and roles of Indigenous staff. Ultimately, they report on the

institutions' progress towards improved educational outcomes for Aboriginal and Torres Strait Islander peoples by cataloguing and briefly explaining the programs and strategies they employ to facilitate Indigenous access, success and completions.

For this project, IES documents were provided where available by PM&C on behalf of participating universities.

Why is this research important?

This project aims to contribute to the improvement of policy and programs for Indigenous outcomes and equity in higher education through the analysis of pre-existing data from IES, and the Department of Education and Training. Variables available for analysis included access, success, retention and completions and information regarding Indigenous staffing levels and monetary spending.

The first part of this project explored the quantitative association between financial investment and success in a selected sample group of eight Australian universities, and asks: *Do universities with greater reported spending have increased positive outcomes in the performance indicator 'success' for Indigenous students 2009–2015?*

In the second part of this project, IES documents from the three participating universities with the highest mean success rate from 2009 to 2015 were examined in more detail to assess and compile a 'benchmark' of strategies in institutions where students are consistently achieving successful outcomes.

Ethics

Datasets provided consist of publicly available de-individualised population-level data regarding Indigenous student programs across the selected universities; therefore, official ethical clearance was not sought for this project. However, as this study was concerned with Aboriginal and Torres-Strait Islander (Indigenous) students, special care was taken to conduct research in a culturally respectful and inclusive manner (Clapham *et al.*, 2007). The senior researcher, Professor Hearn is an Aboriginal Noongar man from Esperance.

Methods

Eleven universities, consisting of the Group of Eight, South Australian institutions (UniSA and Flinders University) and University of Newcastle, were invited to participate in the study. IES are publicly available online, but financial elements are not always included. IES with financial appendices for the years 2009–2015 were therefore obtained from PM&C following permission from universities.

Data on KPI outcomes were available from DET for all 11 universities; however, ultimately only eight of these universities provided consent and/or sufficient data to undertake funding analysis. This may limit generalisability. Of the eight included in financial analysis, IES from the Australian National University (ANU), University of Melbourne (UoM) and the University of New South Wales (UNSW) were further analysed for the purposes of identifying what strategies universities with consistently high success rates employ.

Data and analysis

In Part 1 of the project, a quantitative relationship was explored between yearly spending, staffing figures and access rates, with the outcome of success rate among Indigenous students across the participating universities from 2009 to 2015.

Data on educational outcome variables, 'access, participation, retention and success', are annually reported by the Australian Federal Government's Department of Education and Training (DET), and are available online via the 'Equity Performance Data' series. The Indigenous data include all students, both undergraduate and postgraduate combined (DET Equity data set, Notes). The DET data are complete for all 11 universities and all years (77 data-points).

The KPI 'Success rate' was chosen as the primary outcome indicator. The other KPI used in this study was access rate for each year from 2009 to 2015. These indicators are expressed as a percentage of all domestic onshore students.

- Access Rate = Commencing students in Equity Group/All commencing domestic onshore students
- Success Rate = EFTSL passed/EFTSL certified (passed, failed, withdrawn)

Financial and staffing data were collated from IES statements for the same years 2009–2015. Data were collated for each institution for each year on ISP spending, non-ISP spending, and the number and 'type' of Indigenous staff, i.e. seniority/level, academic, professional and/or casual staff. Some institutions had insufficient data in the IES statements and were excluded from financial and staffing analyses (see tables 1 and 2). IES statements give total Indigenous student enrolment for the year and these enrolment numbers were used to calculate per student capita data on spending and staffing. These calculations were performed to control for variation in total spending and staff numbers due to higher or lower Indigenous student enrolment numbers between participating universities.

The following yearly investment variables were calculated:

- Financial input per student (divide spending by *N* Indigenous student enrolment each year from 2009 to 2015)
- ISP spending
- Non-ISP spending
- Total Spending (this could only be calculated when both ISP + non-ISP details were contained in that year's IES statement)
- Students per staff (divide *N* Indigenous student enrolment each year from 2009 to 2015 by *N* Indigenous staff):
- Indigenous academic staff
- Indigenous professional staff

Professional staff include all administrative and support staff who are not employed in an academic researching or teaching role.

In the first part of this project, the eight universities with financial data were examined together by creating simple bivariate scatter plots and non-parametric correlations between yearly success rate and (1) Spending variables [monetary investment] and (2) Staff-level variables, per student capita.

Association was assessed at the university level by visually examining all yearly data points with colour-coded identification of each university within the overall scatter plots. Correlations between the KPIs access rate and success rate were performed for all 11 universities, as a complete dataset was available for this calculation. SPSS version 25 was used for all analyses (IBM Corp, 2017).

Ecological institution-level correlations were appropriate as individual-level data were not available.

Table 1. Financial investment in Indigenous strategy (ISP, non-ISP and total by year and university)

University	2009	2010	2011	2012	2013	2014	2015
Adelaide							
ISP Spend	np	np	734,798	666,000	571,000	584,000	585,000
Non-ISP Spend	np	np	658,761	641,524	587,869	638,954	977,323
ISP + non-ISP	np	np	1,393,559	1,307,524	1,158,869	1,222,954	1,562,323
ANU							
ISP Spend	np	np	np	574,000	733,434	562,000	538,000
Non-ISP Spend	np	np	np	np	383,663	281,869	86,301
ISP + non-ISP	np	np	np	574,000	1,117,097	843,869	624,301
Flinders							
ISP Spend	473,000	453,000	470,000	np	np	590,204	665,000
Non-ISP Spend	983,109	1,470,287	2,509,274	np	np	2,875,853	3,322,895
ISP + non-ISP	1,456,109	1,923,287	2,979,274	np	np	3,466,057	3,987,895
Melbourne							
ISP Spend	816,000	940,142	1,166,004	np	np	701,000	744,000
Non-ISP Spend	138,871	246,381	537,609	np	np	np	np
ISP + non-ISP	954,872	1,186,523	1,739,727	np	np	np	np
Monash							
ISP Spend	np	np	np	np	np	1,071,731	np
Non-ISP Spend	np	np	np	np	np	np	np
ISP + non-ISP	np	np	np	np	np	np	np
Newcastle							
ISP Spend	1,911,469	2,988,742	3,101,808	np	2,401,440	2,272,072	np
Non-ISP Spend	3,573,609	4,077,495	4,734,602	np	np	np	np
ISP + non-ISP	5,485,078	7,066,237	7,836,410	np	np	np	np
Sydney							
ISP Spend	np	np	np	np	1,400,241	np	np
Non-ISP Spend	np	np	np	np	2,591,975	np	np
ISP + non-ISP	np	np	np	np	3,992,216	np	np
UniSA							
ISP Spend	1,287,628	1,096,000	1,008,000	np	1,197,000	1,001,700	957,600
Non-ISP Spend	2,299,406	2,358,344	2,360,728	np	np	111,300	106,400
ISP + non-ISP	3,587,034	3,454,344	3,368,728	np	1,197,000	1,113,000	1,064,000
UNSW							
ISP Spend	727,000	752,000	np	871,00	902,000	999,000	1,54,000
Non-ISP Spend	1,826,392	1,367,519	np	np	2,911,678	2,004,030	2,267,858
ISP + non-ISP	2,553,92	2,119,519	np	np	3,813,678	3,003,030	3,421,858
UQ							
ISP Spend	802,000	833,000	884,000	np	np	np	
Non-ISP Spend	758,472.9	411,487	263,465	np	np	np	np
ISP + non-ISP	1,560,472.9	1,244,487	1,147,465	np	np	np	np
UWA							
ISP Spend	np	np	np	np	np	np	np
Non-ISP Spend	np	np	np	np	np	np	np
ISP + non-ISP	np	np	np	np	np	np	np

Table 2. Mean yearly spending per student[a]: ISP, non-ISP, Total, by participating university 2009–2015

University	Mean yearly ISP $Per Capita spend	*N* years data	Mean yearly non-ISP $Per Capita spend	*N* years data	Mean yearly total $Per Capita spend	*N* years data
Adelaide	$2999	5	$3258	5	$6258	5
ANU	$3685	4	$1489	3	$5145	3
Flinders	$2918	4	$10,600	4	$13,518	4
Melbourne	$4155	5	$1582	3	$6606	3
Newcastle	$3601	5	$6739	3	$11,054	3
UniSA	$3251	6	$4485	5	$7719	5
UNSW	$3823	6	$8388	5	$11,500	5
UQ	$3485	3	$2058	3	$5544	3
Total	$3502	38	$5118	31	$8597	31

Student–staff ratios and access rates (data available on request).
[a]Variable number of years for different universities due to missing data.

In the second part of the project, IES documents provided details of how funding received from the ISP in the preceding year was spent. The ANU, UoM and UNSW had a mean yearly success rate above 80% from 2009 to 2015 and were selected as 'benchmark' case studies. Program information from these three universities was coded and tabulated. IES documents were the primary data source; however, where possible, corresponding internal policy, student prospectus and other relevant publications were identified and obtained online for the purposes of cross-checking.

Programs and strategies were broadly categorised within six overarching 'umbrella' categories: student support and opportunities for students; internal decision making; postgraduate and research capacity; entry pathways; community outreach/recruitment programs; and employment.

Results

Quantitative analysis

Financial data

Financial data were collated for the 11 universities from IES reporting and are shown in tables 1 and 2. Table 1 demonstrates the variation in the completeness of IES reporting between and within the universities. Total spending could only be calculated when both ISP and non-ISP spending was provided in the corresponding IES document. Where data were not provided, it is marked as 'np'.

Many documents only detail ISP spending, with some IES documents containing no financial details.

There were some years (2012, 2013) where many institutions appeared to have no IES documentation available. This has resulted in a large number of missing data points; of the 11 universities that were approached and invited to provide data, 2009–2015 (7 years, a total of 77 data points), total ISP spending was only available in 41 data points, while non-ISP spending was only available for 33 out of a possible 77 data points.

Very few financial data points were available for Monash, Sydney and UWA (table 1) for various reasons and these three institutions were excluded from financial analysis.

Table 2 indicates the mean yearly spend per student capita by eight participating universities. The highest total spend per capita was $13,518 by Flinders and the lowest was $5145 by the ANU. The other universities are distributed $5544–$11,500 mean spend per student, per year.

The student–staff ratios were highly varied across participating universities.

Students to Professional Staff Ratio tended to fluctuate year to year; however, they generally hover around a ratio of 10:1. UniSA displayed a variable but high ratio of Indigenous students to Indigenous professional staff over time, with 30 students per staff member for 2011 and 2013 (2012 data missing). Flinders displayed a change in ratio from five students per professional staff member, to 25 per professional staff 2009–2015.

Students to Academic Staff Ratio also varied. Newcastle displays the highest ratio, with around 40 students per Indigenous academic staff member, 2009–2015. All other participating institutions display a mean rate of around 20:1 Indigenous academic staff to Indigenous students, except for UQ, which displays the lowest ratio of around 10:1 over this time period.

Indigenous Access Rates, which indicates the proportion of equity group students in their student population (Australian Federal Government, 2017b), were highest for Newcastle who steadily increased over time from approximately 2.5 in 2009, to nearly 4 in 2015. Melbourne, Flinders and Adelaide all show slight increases in access rate over this time. The other participating universities all displayed some fluctuation, but generally display a rate in 2015 that is equal or slightly less than that in 2009.

Key educational outcome variable: success rate

Figure 1 demonstrates a small but consistent increase in mean success rate for Indigenous students from the 11 universities (77.5–79.5%) between 2009 and 2015. Although this is a relatively small increase over 7 years, the curve suggests a trend to improvement in outcomes for Indigenous students amongst participating universities.

Table 3 shows yearly reported success rate and indicates the degree to which success may fluctuate both within and between universities year-to-year.

Adelaide demonstrated the lowest mean success rate (63%) for Indigenous students, 2009–2015.

ANU shows the highest mean success rate over this time (88%), closely followed by Melbourne and UNSW. The other

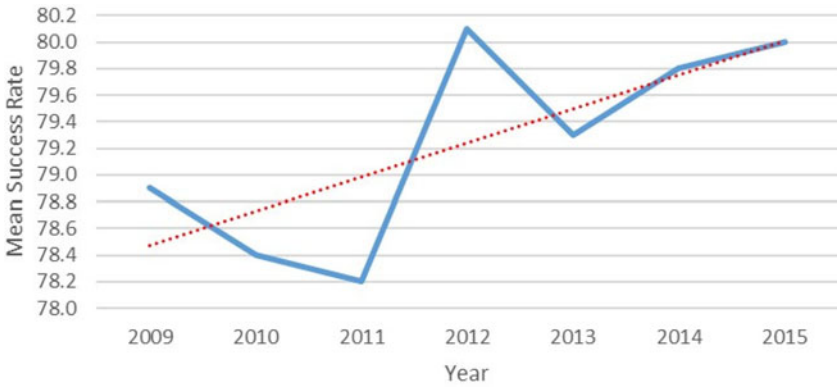

Fig. 1. Mean success rate: Go8, UniSA, Flinders, and Newcastle 2009–2015.

Table 3. Success rates (%) by university ($n = 11$) by year 2009–2015

University	2009	2010	2011	2012	2013	2014	2015	Mean	SD
Flinders University	74.1	70.7	71.3	74.6	75.8	76.6	80.9	74.8	3.5
Monash	86.0	84.9	83.9	86.6	87.9	84.9	85.6	85.7	1.3
ANU	88.2	88.5	88.0	90.5	86.5	86.5	85.0	87.6	1.8
University of Adelaide	61.9	58.8	60.1	64.8	63.5	65.4	67.1	63.1	3.0
University of Melbourne	86.1	84.7	79.7	83.9	84.7	84.4	85.0	84.1	2.0
UNSW	81.9	86.0	84.5	81.7	85.1	81.3	84.4	83.6	1.9
University of Newcastle	73.8	75.7	77.0	77.1	74.8	75.6	76.4	75.8	1.2
University of Queensland	76.5	75.8	80.3	79.8	78.3	79.8	82.2	79.0	2.2
University of Western Australia	78.0	74.6	73.4	76.8	76.0	80.2	75.4	76.3	2.3
University South Australia	76.0	79.0	78.6	79.5	74.9	78.2	74.0	77.2	2.2
University of Sydney	85.7	84.0	83.4	85.6	84.8	85.1	84.4	84.7	0.8

participating universities cluster around 75%. The standard deviation shows that the most variability is demonstrated by Flinders, while Newcastle shows the smallest standard deviation. While Adelaide consistently demonstrates the lowest success rate, it also exhibits a trend of improvement, 2009–2015.

Correlations

Table 4 demonstrates that no correlation was found between monetary spend per student capita and success rate, or between students per academic staff and success rate. However, a statistically significant negative correlation is displayed between access rate and success rate, and between students per professional staff and success rate.

Scatter plots were drawn between the educational outcome of success rate with the variables access rate, monetary investment and student–staff ratios, and were assessed by visually examining all yearly data points with colour-coded identification of each university within the overall scatter plot. Success rate by access rate is shown in figure 2 and success rate by monetary spend per capita is presented in figure 3.

Figure 2 demonstrates the negative correlation between access rate and success rate. Newcastle University (orange) stands out as showing a different pattern, demonstrating very high but variable access rates, with success rates around 75% consistently across all years.

Figure 3 shows the scatterplot between per capita total spending and success rate. The scatterplot and correlation (table 4) indicate a lack of overall association between spending and success rate.

However, there is a possible suggestion that within some universities, yearly spending may correlate with yearly success. For example, ANU and UNSW possibly display such a relationship. Melbourne possibly demonstrates the opposite. Due to missing data points, only tentative conclusions can be drawn.

Benchmark programs and strategies

The three universities with over 80% success rate average for the years 2009–2015 could be considered a 'benchmark' standard. Programs and strategies documented in IES are shown in table 5.

This should not be considered an exhaustive list of all strategies, approaches and programs that these universities employ to support Indigenous students, but more an indicator of variation between institutions, and the breadth and depth of 'outputs' that are required to facilitate success. In the 'Internal Decision Making' domain, all three universities were explicitly enacting elements of the Behrendt review and had Indigenous representation in decision making.

The 'Support Mechanisms and Student Opportunities' domain indicates that designated student study space, general scholarships

Table 4. Correlation[a] between spending, staffing and access with success

Variable v success	Correlation coefficient	*P* value	*N* data points (university, year)	*N* universities
Total spend per capita	−0.01	0.95	32	8
Students per academic	−0.11	0.48	41	8
Students per professional	−0.37	0.02*	41	8
Access rate	−0.69	0.00**	77	11

[a]Spearman non-parametric correlation coefficient.

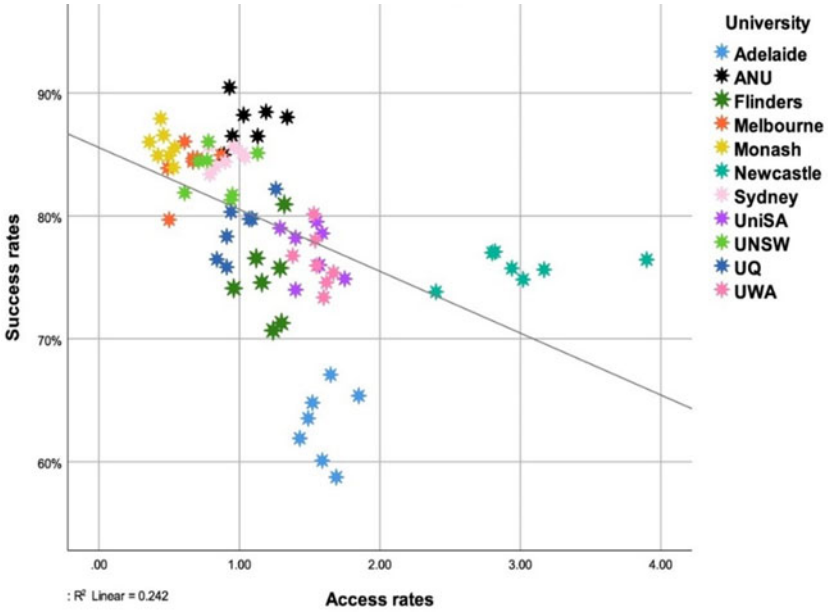

Fig. 2. Success rate v access rate 2009–2015 (11 universities, 77 data points).

and accommodation scholarships were prioritised by all three. The 'Outreach and Community Facing' strategies and programs indicate all three universities were undertaking outreach to high schools. 'Entry/Enabling Pathway' strategies and programs appeared more variable with two universities reporting specific programs and/or pathways. The category 'Employment policies and Staff Opportunities' indicates all three had senior/executive Indigenous staff, international study grants for Indigenous staff and parity targets for both professional and academic staff.

Discussion

Despite the continued investment in Indigenous support networks and dedicated education units within universities, levels of key performance indicators for Indigenous students—access, participation, success and completion (attainment)—remain below that of the overall domestic student population in most institutions (Department of Education and Training, 2018; Devlin, 2009). It remains important to determine 'what works' to achieve Indigenous student success in higher education, a discussion in which quantitative methodologies and analysis appear to be underutilised. This paper proposes that such methods have an integral role to play in providing a holistic view of Indigenous participation and success at university, and are particularly useful in the development and evaluation of strategies and programs.

This project found no quantitative correlation between financial investment and success rate for Indigenous students. A negative correlation between access rate and success rate suggests that factors other than those that encourage participation are important in supporting successful outcomes. Those universities that have high success rates have a suite of programs to support Indigenous students, but it is not immediately clear which of these strategies and programs may be most effective to facilitate Indigenous student success rates. In this discussion, we suggest that a multi-layered determinants model is a useful way to conceptualise the many factors that may impact on student success, and how they might intersect.

The use of quantitative data

There appears to be an under-utilisation of pre-existing population-level data to identify possible predictors of, or barriers to, success for Indigenous students in Australia. Smith *et al.* evaluated Indigenous strategies in higher education and highlight the need to develop and implement more comprehensive performance and outcome-based evaluations and funding systems to identify the most effective strategies (Smith *et al.*, 2018). Such modelling and evaluations have been utilised in the United States to enhance 'accountability and transparency' for several years (Rutherford and Rabovsky, 2014).

However, quantitative analysis depends on good data. The most significant limitation to this project is the relatively incomplete dataset, which achieved an overall rate of just under 50% of financial data points desired in the original project design (34/77).

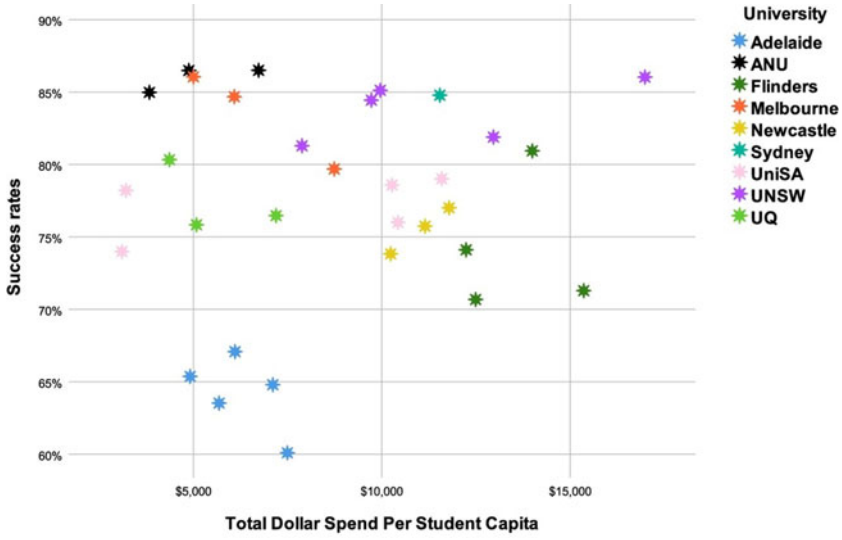

Fig. 3. Success rate v total spend per capita 2009–2015 (8 universities, 32 data points).

Some of the universities approached were unable to provide permission or relevant information within the time constraints of the project, and many IES reports provided did not contain all necessary information as they were missing the financial reconciliation elements. This incomplete data reduce the generalisability of the results regarding spending on students (Natalier, 2013) and therefore limit the universal recommendations that can be drawn. A more concerted approach by universities could provide extremely useful findings regarding monetary investment in student success. Aiming for improved data collection is one of the key findings of this project.

Success as an outcome indicator

Success rate was the key educational outcome indicator selected for this project and reflects the proportion of Full-Time Equivalent (FTE) courses attempted that are passed. Student success is an important outcome in student KPI data as it provides a 'real-time' yearly indicator of likelihood of progression and completion. Achieving success is important for students as it is likely to have a significant positive psychological effect (Behrendt *et al.*, 2012; Budgen *et al.*, 2014). Access without success may be damaging to the individual's self-esteem, and to the place of higher-education within the social capital of Indigenous communities (Baum, 2007; Budgen *et al.*, 2014). Success also means that students avoid repeating courses leading to extended time at university and potentially large student debts. Success data can be collected and analysed not only at the yearly institutional level, but also at faculty and semester program levels. It potentially allows a more agile and responsive surveillance support strategy for students.

Financial data

There are few pre-existing data sources as comprehensive as IESs.

Although they are not a total list of Indigenous funding and programs from universities, IES documents give some understanding towards the expenditure of government funding in the preceding year and provide some detail about further university spending on Indigenous staff, infrastructure, programs and strategies (non-ISP funding). Non-ISP expenditure fell under 'optional information' in IES reporting so is not always provided. In this project, a limitation was that total spend could only be calculated in those years that both ISP and non-ISP funds were provided. We would recommend that these data should not be optional but compulsory reporting, and that a standardised approach to calculating financial spending would be very valuable for evaluation of programs.

Overall, evidence of a clear association between financial spending and student success was not displayed based on the data available in this project. For two individual universities, there are suggestions of positive trends between yearly spending and success. Universities may differ significantly in Indigenous student 'characteristics' and in support offered and this may mean that an overall analysis is less useful than university-level analysis. For example, one of the findings of this project was a negative correlation between access and success rates. Pechenkina *et al.* (2011) report a 'dual system of Indigenous education', whereby those universities that 'excel at Indigenous student commencements' differ from those that 'excel at Indigenous student completions'.

Benchmarking

The universities that reported the greatest mean student success 2009–2015 were the ANU, UoM and UNSW. IES statements submitted 2012–2015 were analysed for program details and content to identify 'benchmark' strategies that may contribute to student success. Often universities had similar component parts of student support and more in-depth analysis of strategies in institutions with successful outcomes would be worthwhile, and more detailed comparisons between 'successful' and 'non-successful' universities would be valuable future research.

Currently, the data in the IES documents are difficult to compare across institutions—while IES documents are unique sources of data, there is often marked variation in the detail and format of these documents both within and between universities. There was inconsistency in the ways in which spending was detailed and there may be different interpretations of requirements of IES. The problems with continuity in IES reporting within and between universities were also noted by Behrendt *et al.* (2012). A first step towards useful recommendations would be to improve the data collection process.

Table 5. Student support and opportunities, 'benchmark' universities 2009–2015

Internal decision making	*N*
Indigenous representation in executive decision making	3
Indigenous representation in all faculties	1
Whole of University approach	1
Enacting Behrendt review	3
Cultural standards/Indigenous strategy document	1
Support Mechanisms & Student Opportunities	N
Student experience operational plan	1
Accommodation scholarships	3
General scholarships	3
Designated Indigenous student study space	3
HECS/HELP exempt scholarships	1
Short course scholarships	1
'On country' learning opportunities	1
Competing in Indigenous tertiary education student games	1
Student orientation at beginning of semester	3
System to actively identify underperforming students	1
Indigenous awards night	1
Indigenous Alumni engagement	2
Music/language centre	1
Indigenous student ambassador/leader program	1
Outreach and Community Facing Strategies and Programs	*N*
Outreach w/high schools	3
TAFE partnership	2
'On campus'/University led taster camps/experiences	2
Residential student science experience	2
Community outreach program	1
Entry Pathway Strategies and Programs	*N*
TAFE pathway/associate degrees	2
Enabling program/Secondary college (UPP)	2
Winter/Bridging school	1
Medical preparation enabling program	1
Indigenous admission pathway	2
Employment policies and Staff Opportunities	*N*
Pathway from TAFE to employment at University	1
Cadet program	1
Parity target	3
International study/work grants for staff	3
Postgraduate study contract 'buyout' option	2
Indigenous employment committee	1

Determinants of student success

It is important to bear in mind that elements that influence and affect student success are likely to be complex and often depend on factors beyond programs and strategies provided by universities.

Factors that impact on a student's ability to succeed occur at many levels, and individual- and institutional-level factors should always be considered within the over-arching context of Indigenous history in Australia. Multi-layered determinants models consider the individual, social and structural elements that may intersect to influence the likelihood of a particular outcome and are widely used in health, particularly public health and health promotion. Models such as the World Health Organisation's Commission for the Social Determinants of Health (CSDH, 2010) identify 'underlying', 'distal' and 'proximal' factors which may negatively or positively impact on the individual's health.

These equally apply to higher-education, where many structural factors, mainly outside the student's control, may intersect (Martin and Kipling, 2006) to impact on their ability or desire to attend university, and to succeed. A 'Determinants of Student Success' framework is a useful way to consider the factors influencing student outcomes at university. These could be considered as underlying socio-political influences, intermediate structural factors such as University support, and proximal individual characteristics.

Rose (2014) and Gallop and Bastien (2016) proposes a framework of student learning in their evaluation of the Aboriginal and Torres Strait Islander education action plan, implemented by the Australian Government in 2010 whereby academic success is contingent on several strata of factors that influence the acquisition of academic skills. They identify these broadly as 'Contextual', 'School' or 'Student' level factors.

Consideration of where a university program may sit within such a multi-layered framework is necessary when evaluating university outcomes for Indigenous students.

Conclusion

Without evidence-based evaluation, strategies and programs that facilitate Indigenous student success may 'be run in isolation', falter and eventually lead to disillusionment and frustration from stakeholders, students and staff (Pechenkina and Anderson, 2011, p. 12). Funding for Indigenous strategy is dependent on university internal policy, which in turn indicates that institution's commitment to Indigenous advancement for both students and staff.

Significant variation in statistical indicators, such as access and success, is found between universities and underlines the reality that there is likely to be no 'single-fix' or 'one-size-fits-all' solution to the disparity in higher education outcomes between Indigenous and non-Indigenous Australians (Pechenkina et al., 2011). Consistent with the notion that there are multiple factors that contribute to student success, a multifaceted approach by universities is warranted to make tertiary education more accessible, supportive and ultimately successful for Indigenous students (Clapham *et al.*, 2007; Devlin, 2009).

This project did not show evidence of an association between success and spending. However, data were incomplete and more complete data may provide a different insight. Universities showed different patterns of success, spending and staffing, and benchmarking can provide an understanding of strategies that may facilitate sustained success for Indigenous students. It is important to continue investigating the predictors of success in order to establish 'best practice' for Indigenous success strategies in the future. This would involve a major commitment to ongoing research with the collection of a wide range of variables that may

affect student outcomes in order to allow robust and informative analyses.

As student numbers grow, it is increasingly important to move away from simply getting students through the door, and to use evidence-based practice, evaluation and statistical measurement to assist in identifying what works for Indigenous students. This project was developed to examine some possible predictors of Indigenous student success, using pre-existing data from the Department of Education and Training, and IES documents. It is a step towards using an evidence-based quantitative approach to identify factors, methods and strategies that may contribute to Indigenous student success.

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