Institutional collaboration through national project funding

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This study explores institutions' collaborative involvement through Carrick/ALTC/OLT project funding. Encouraging collaboration was a core value of this funding body, which clearly occurred. Less clear, however, are the shapes and structures of these collaborations. Using social network analysis (SNA), this study explores emergent patterns of collaborative ties between funded institutions. The results suggest that the body's funding has created a mostly well-connected network of collaborative ties. Some institutions, however, were found to be less integrated into the network structure, while others appear as central players.

Keywords: Institutional collaboration, project funding, social network analysis

Introduction

In May 2015 the Australian Government announced its decision to abolish the Office for Learning and Teaching (OLT) and to replace it with a new institutionally-hosted national institute, which takes effect 1 July 2016 (OLT, 2015a). When the OLT closes on 30 June 2016, it will mark the end of an initiative spanning 13 years. Starting under the name of the Carrick Institute for Learning and Teaching in Higher Education (Carrick), the initiative was launched on 11 August 2004. It received a name change to the Australian Learning and Teaching Council (ALTC) in 2008, and then another in 2011 when it became the Office for Learning and Teaching. At this point the body ceased to be a wholly owned Commonwealth Company and became a new branch of the now-known Department of Education and Training.

Although subject to name and governance changes, the body's remit has remained largely unchanged. This remit, based on extensive sectorial consultation, comprised a mission, objectives, key responsibilities, priority areas, and values and principles for action. As presented in its first Annual Report (Carrick, 2005), its mission was "to promote and advance learning and teaching in Australian higher education" (p.11). Its values and principles for action were

> Inclusiveness - by assisting the development of networks and communities which support higher education staff who have a direct impact on the advancement of learning and teaching.
>
> Long-term change - through a focus on systemic change.
>
> Diversity - by recognising and valuing institutional and disciplinary differences and similarities.

> Collaboration - through the programs it funds and in its work practices.
>
> Excellence - through the recognition of quality in its programs and awards and its encouragement of higher education institutions' recognition of quality teaching and learning (Carrick, 2005, p.12).

Of particular interest to this study is the fourth value and principle for action: "Collaboration - through the programs it funds and in its work practices." More specifically, this paper is interested in how this value and principle for action has helped to foster collaborative ties amongst various institutions operating within the Australian Higher Education (HE) sector. Evidence of institutional collaboration being fostered by the body can be ascertained by the number of projects funded over the years, and the multi-institutional involvement in most of these projects. However, the shape and structure of these collaborations is unknown.

Encouraging institutional collaboration

Just before the ALTC closed in December 2011, it produced and disseminated a legacy document (ALTC, 2011), which contained key operational information from its inception as Carrick to its closure as the ALTC. Within this document, the following statement was made regarding the body's support of collaboration.

> The ALTC actively encouraged collaboration throughout all its programs including grants, awards, fellowships and learning network programs. By offering cross-institutional funding for projects involving more than one institution, the ALTC enabled work to be undertaken on a national scale. The majority of projects funded under the grants program involved partnerships, some which include industry organisations or higher education institutions (ALTC, 2011, p.8).

Following its establishment in 2012, the OLT continued to encourage institutional collaboration. In the most recent program information and application instructions, for example, it specifically states that "collaboration between higher education institutions (university and non-university) and/or relevant other bodies is strongly encouraged" (OLT, 2015b, p.9).

With reference to the institutions being encouraged to collaborate, there has always been a main set of around 45 institutions, each of which is eligible for direct funding by the body. Most of these institutions are listed in Table A of the Higher Education Support Act 2003. Table B listed institutions of the Act are also present in the set, along with a number of other HE providers receiving funding under the Commonwealth Grants Scheme. Institutions within the full set are geographically dispersed across Australia, although some are situated within the same state or territory, and even the same capital city. Many of those classified as Table A providers are also members of one of four institutional associations. These associations are the Australian Technology Network (ATN), the Group of Eight (Go8), the Innovative Research Universities (IRU), and the Regional Universities Network (RUN).

With reference to the enablers of collaboration, the main enabler was the funded project. Most projects were funded through the Grants Scheme, which comprised different program types (e.g., Innovation and Development Grants, Strategic Priority Projects, Extension Grants). These grants were competitive, mostly open for submissions twice per year, with a funding range of $80,000 to $150,000 per grant (ALTC, 2011, p.10).

Reporting institutional collaboration

At the end of each calendar year, Carrick and the ALTC published detailed reports of the projects it funded. These reports gave information on the number of applications received, the institutions receiving the funding, and the number of times the institution was the lead or partner on funded projects. They also gave information on each project funded and the institutions involved in the funding arrangements. However, it was up to the reader to determine which institutions were collaborating on more than one project in any one year or across years.

The OLT also reported on the projects it has funded. These reports were much briefer than those provided by Carrick and the ALTC, but most still showed each project funded in the round, along with information identifying the lead institution and partner institutions on the project. The 2014 reports do not provide information on project partners. However, this information is available on an OLT webpage that lists its funded projects (http://www.olt.gov.au/list-projects). Indeed, all projects funded by the body (from 2005 to present) are listed on this webpage. Further, each project is listed in detail, including information on lead and partner institutions for each project. However, information about which institutions were collaborating on more than one project or across years can only be established by scrutinising each project.

Carrick, ALTC and OLT reporting of its funded projects also failed to provide information on cumulative collaborative instances. The provision of such information is labour intensive and providing information such as partnership patterns requires sophisticated analyses being performed. However, given that the OLT is being closed and replaced by a newly established institute, it is appropriate to conduct these analyses to provide insight into the collaborative instances that the body supported through its project funding. It offers the body and its stakeholders a more macro view of the institutional collaboration it fostered. Such analyses can be performed using social network analysis.

Social network analysis

As mentioned earlier, there has always been a 'main set' of institutions funded by the body — those eligible for direct funding. This set can be viewed as a group of entities 'strongly encouraged' to undertake projects with each other, which they did. They can also be viewed as a set of entities situated within a square matrix, with each institution having the *potential* to collaborate with any other in the matrix. Viewed from this perspective, these institutions are a network, and are well suited to be explored using social network analysis (SNA). According to Pryke (2012), SNA is "essentially a form of structural analysis, allowing mathematical and graphical analysis of what might be otherwise regarded as essentially qualitative data" (p.77). This analytical approach places importance on the relationships existing between interacting units (Wasserman & Faust, 1994). This approach differs from the more traditional one in the social sciences, where the focus is not on the relationships existing between the units, but rather how these units relate to various attributes. SNA enables the structural properties of networks to be investigated. It has 'emancipatory potential' according to Kilduff and Tsai (2003), in that the results of SNA "can inform actors of non-obvious constraints and opportunities inherent in patterns of social connections" (p.23). SNA also provides the opportunity to tell the story of a network and understand the nuances of complexity about that network (Durland, 2005).

Dating back to the 1930s and stemming from a number of backgrounds (namely sociology, mathematics, and anthropology), SNA allows actor relations to be examined at multiple levels of analysis. It allows, for example, the examination of both the micro- and macro-linkages between actors (Fredricks & Durland, 2005). The results of these analyses typically take two forms: numerical data and visual images (Durland, 2005). Numerical data provide estimates of various actor relations. These can be, for example, for the whole network (e.g., network density) or for each individual actor within the network (e.g., degree of centrality). The other output, visual images, provides displays of the network structure (Wasserman & Faust, 1994). These usually take the form of a sociogram or social map (Durland, 2005), with the actors typically depicted as a geometric shape and their relations presented as lines. Together, these images and the numerical output measures provide the information necessary to examine social networks. They also provide the information necessary to explore the shape and structure of institutions' collaborative involvement through Carrick/ALTC/OLT project funding.

The aim of this study was to explore the shape and structure of institutions' collaborative involvement through Carrick/ALTC/OLT project funding through three research questions: (1) To what extent have institutions collaborated with each other? (2) Are some institutions more involved than others in collaboration? and (3) Do cliques or sub-groups exist within the projects funded?

Methods

Subjects

Subjects in this study were the 47 institutions eligible for funding by the OLT as at July 2015. This set is essentially the same as those eligible for funding by Carrick and the ALTC, with a few additions (e.g., North Melbourne Institute of Technology). A few have also changed their name over time (e.g., University of Ballarat to Federation University), but are the same institutions. All institutions in the set are listed in Table 2. This list also shows each institution's provider status (e.g., Table A), the state in which it is situated, and its affiliation, if it has one.

Procedure

All projects listed on the OLT website from 2005-2014 were inspected to determine which involved institutions within the 'set.' Any institution that was not part of the set (e.g., an overseas institution) was treated as 'not applicable' and excluded. Those projects involving single institutions were culled. Those projects involving a single set member and a non-applicable institution (or institutions) were also culled. 458 projects totalling $97.67 million remained. Each of these projects was then inspected to identify which of the institutions in the set were involved in each project and coded. Relational ties for each partnership were then generated for the collaborative instances and analysed using the social network analysis tool UCINET (Borgatti, Everett & Freeman, 2002) and its accompanying graphic package Netdraw. As institutions collaborated on many projects over time, this means that valued tie data were captured, where the strength of ties could be examined (along with the more typical binary ties).

Descriptive statistics were first performed on these coded data. Next, sets of analyses were undertaken using UCINET. The first examined network density. At the binary tie level, density reflects the number of dyadic ties present in a network compared to the possible maximum. If all actors within a network are related, the density of the network would be

100%. At the valued tie level, density reflects the total number of ties divided by all possible ties. In this present study, density was used to explore the question: *To what extent have institutions collaborated with each other?* The second set of analyses performed measured Freeman's degree centrality. This measure reflects the number of ties each actor has with others in the network. Those with more ties are argued to be more embedded within the network (Hanneman & Riddle, 2005). In this study, centrality was used to explore the question: *Are some institutions more involved than others in collaboration?* The next set of analyses performed concerns the identification of cliques or sub-groups within a network. In this study, they were used to explore the question: *Do cliques or sub-groups exist within the projects funded?* Finally, graphical representations of the collaborative ties for all projects combined were explored using UCINET's Netdraw. Both binary and valued collaborative ties were explored.

Results

Descriptive statistics

Of the 458 projects analysed, institutional participation ranged from zero projects (North Melbourne Institute of Technology) to 94 (The University of Queensland), with an average of 38.51 projects (see Table 2 for each institution's participation tally). On average, institutions within the set collaborated with 3 others on projects, but the range was large (from 2 to 22 partners). As can be seen in Table 1, the strongest collaborative partnership was between The University of Queensland and The University of Sydney, who collaborated on 22 different projects.

Table 1: Five strongest partnerships in network

Institutions	Number of Ties
The University of Queensland and The University of Sydney	22
Deakin University and Queensland University of Technology	18
The University of Melbourne and The University of Sydney	17
The University of Melbourne and The University of Queensland	16
Curtin University and Queensland University of Technology	16

Social network analysis

Density

At the binary ties level, the density analysis produced a score of 0.68, meaning that 68% of all possible ties within the network existed. At the valued ties level, the density score was 3, meaning that across the network, institutions had, on average, collaborated with each other on three occasions.

Centrality

At the binary ties level, the average degree measure was 31.40. The Australian Catholic University (ACU) had the highest degree centrality score of 41, meaning that the ACU had collaborated, at least once, with 41 institutions in the set. The next most central institution at the binary level was Monash University (40), followed by The University of New South Wales, University of Newcastle, and Curtin University (each with 39). At the valued ties level, Queensland University of Technology (QUT) had the highest degree centrality score of 278, indicating that QUT had a total of 278 collaborative ties within the network. Monash University had the second highest score of 262, followed by Curtin University (258), Deakin University (244) and The University of Melbourne (242). Information on each institution's centrality scores can be found in Table 2.

Table 2: Institutions in study

Institution	Short Name	Provider	State	Affili-ation	Projects	Centrality[1]
Australian Catholic University	ACU	Table A	MULTI	None	29	41 (97)
Avondale College of Higher Education (NSW)	Avondale	Other	NSW	None	3	8 (9)
Batchelor Institute of Indigenous Tertiary Education	Batchelor	Table A	MULTI	None	1	1 (1)
Bond University	Bond	Table B	QLD	None	8	36 (60)
Charles Darwin University	CDU	Table A	NT	IRU	16	37 (101)
Charles Sturt University	CSU	Table A	NSW	None	47	38 (166)
Christian Heritage College (QLD)	CHC	Other	QLD	None	1	3 (3)
Central Queensland University Australia	CQU	Table A	QLD	RUN	28	38 (140)
Curtin University	Curtin	Table A	WA	ATN	79	39 (258)
Deakin University	Deakin	Table A	VIC	None	58	37 (244)
Edith Cowan University	ECU	Table A	WA	None	44	38 (161)
Federation University Australia	FedU	Table A	VIC	RUN	9	28 (47)
Flinders University	Flinders	Table A	SA	IRU	35	38 (176)
Griffith University	Griffith	Table A	QLD	IRU	61	37 (238)
Holmesglen Institute of TAFE	Holmesglen	Other	VIC	None	1	1 (1)
James Cook University	JCU	Table A	QLD	IRU	38	38 (146)
La Trobe University	La Trobe	Table A	VIC	IRU	40	38 (165)
Macquarie University	Macquarie	Table A	NSW	None	53	38 (208)
Monash University	Monash	Table A	VIC	Go8	72	40 (267)
Murdoch University	Murdoch	Table A	WA	IRU	39	38 (145)
Northern Melbourne Institute of TAFE	NMIT	Other	VIC	None	0	0 (0)
Queensland University of Technology	QUT	Table A	QLD	ATN	80	38 (278)
RMIT University	RMIT	Table A	VIC	ATN	66	37 (222)
Southern Cross University	SCU	Table A	NSW	RUN	22	37 (95)
Swinburne University of Technology	Swinburne	Table A	VIC	None	18	36 (86)
Tabor College Inc. (SA)	Tabor (SA)	Other	SA	None	3	10 (11)

Table 2 (continued)

Institution	Short Name	Provider	State	Affili-ation	Projects	Centrality[1]
Tabor College Inc. (VIC)	Tabor (VIC)	Other	VIC	None	2	5 (7)
The Australian National University	ANU	Table A	ACT	Go8	36	36 (139)
The University of Adelaide	Adelaide	Table A	SA	Go8	42	36 (137)
The University of Melbourne	Melbourne	Table A	VIC	Go8	81	36 (242)
The University of New South Wales	UNSW	Table A	NSW	Go8	51	39 (163)
The University of Newcastle	UoN	Table A	NSW	None	58	39 (207)
The University of Notre Dame Australia	Notre Dame	Table B	MULTI	None	12	30 (60)
The University of Queensland	UQ	Table A	QLD	Go8	94	38 (235)
The University of Sydney	Sydney	Table A	NSW	Go8	90	37 (228)
The University of Western Australia	UWA	Table A	WA	Go8	47	37 (161)
University of Canberra	UC	Table A	ACT	None	29	36 (115)
University of Divinity	UD	Table B	MULTI	None	1	4 (4)
University of New England	UNE	Table A	NSW	RUN	35	36 (106)
University of South Australia	UniSA	Table A	SA	ATN	64	36 (176)
University of Southern Queensland	USQ	Table A	QLD	RUN	44	37 (187)
University of Tasmania	UTAS	Table A	TAS	None	54	38 (211)
University of Technology Sydney	UTS	Table A	NSW	ATN	71	38 (215)
University of the Sunshine Coast	USC	Table A	QLD	RUN	13	35 (53)
University of Western Sydney[2]	UWS	Table A	NSW	None	52	38 (188)
University of Wollongong	UoW	Table A	NSW	None	55	37 (165)
Victoria University	VU	Table A	VIC	None	28	38 (117)

[1] Binary tie degree score given first, valued tie score given in parenthesis.
[2] This institution has since changed its name to Western Sydney University, but was not known as this in the years analysed (2005-2014).

Clique and sub-groups

At the binary ties level, 66 cliques were found. However, there were no distinctive patterns discovered. Most cliques had more than 15 institutions involved. At the valued ties level, two sub-groups were discovered when the strength of the weakest tie was set at 3 (representing the average density score). Institutions in these two sub-groups had strong tie values of 15, meaning that within each sub-group each collaborated with one another on, at least, 15 projects. The first sub-group extracted comprised the following five institutions: Curtin University, Deakin University, Queensland University of Technology, RMIT University, and the University of South Australia. Each institution in this sub-group is a member of the Australian Technology Network (ATN). The second sub-group had four institutions: Monash University, The University of Melbourne, The University of Queensland, and The University of Sydney. These are all Group of Eight (Go8) members.

Graphical representations

Figure 1 shows the graphical representation of the binary ties within the institutional set (see Table 2 for full name of node labels). This figure was generated using the Spring Embedding procedure with geodesic distances, node repulsion, and equal edge length layout criteria (see Hanneman & Riddle, 2005, p.10). This figure shows that most institutions are connected to each other, with some more centrally located than others within the network. This figure also indicates that a small number of institutions are less-well connected to the main group, but have connections with each other. Further, as can be seen by the names of these nodes, these are classified as 'other' HE providers by Carrick/ALTC/OLT. Figure 1 also shows that many of these 'other' institutions are connected to the main group (mainly Table A providers) through the Australian Catholic University (ACU), hence why the ACU had the highest degree centrality score are the binary level.

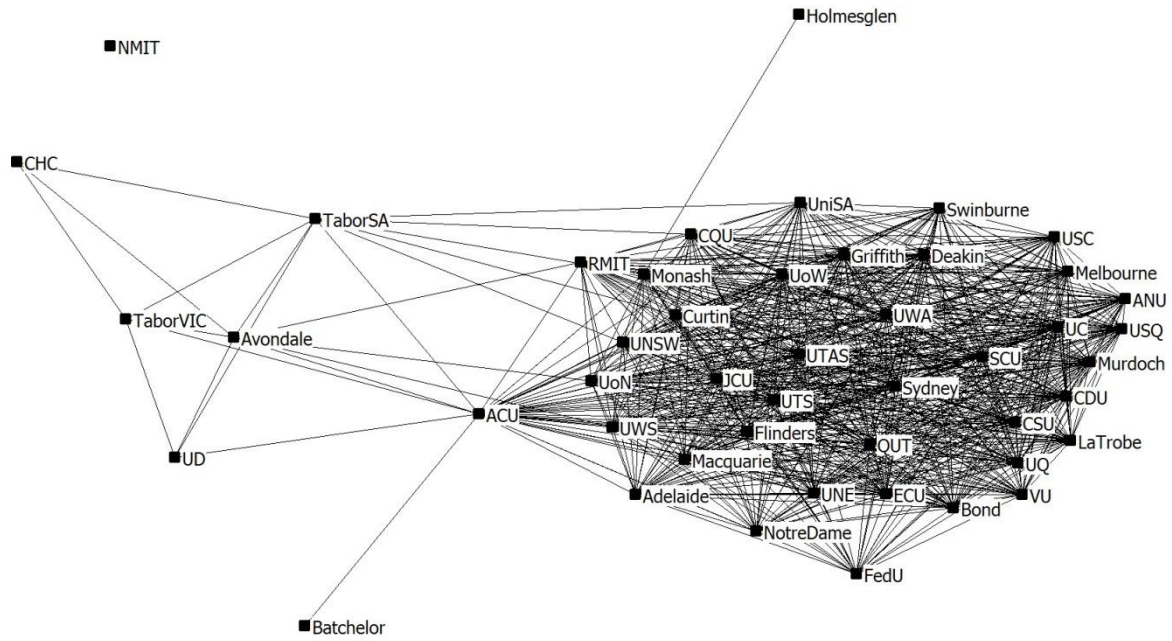

Figure 1: Binary ties network diagram

Figure 2 shows a graphical representation of the collaborative ties at the valued level. This figure was generated using multiple dimensional scaling and represents the degree of actor similarity when tie strength is considered. This figure again shows a main group of

institutions and the others 'hanging off' the edge of the graph. Those classified as 'other' are particularly disconnected from the main group. The three Table B providers (Bond University, University of Divinity and The University of Notre Dame Australia) are also located on this sparse side of the graph. This figure has also positioned the most similar institutions at the centre of the graph, which resonates with the valued centrality scores (e.g., QUT and Monash identified as the most central).

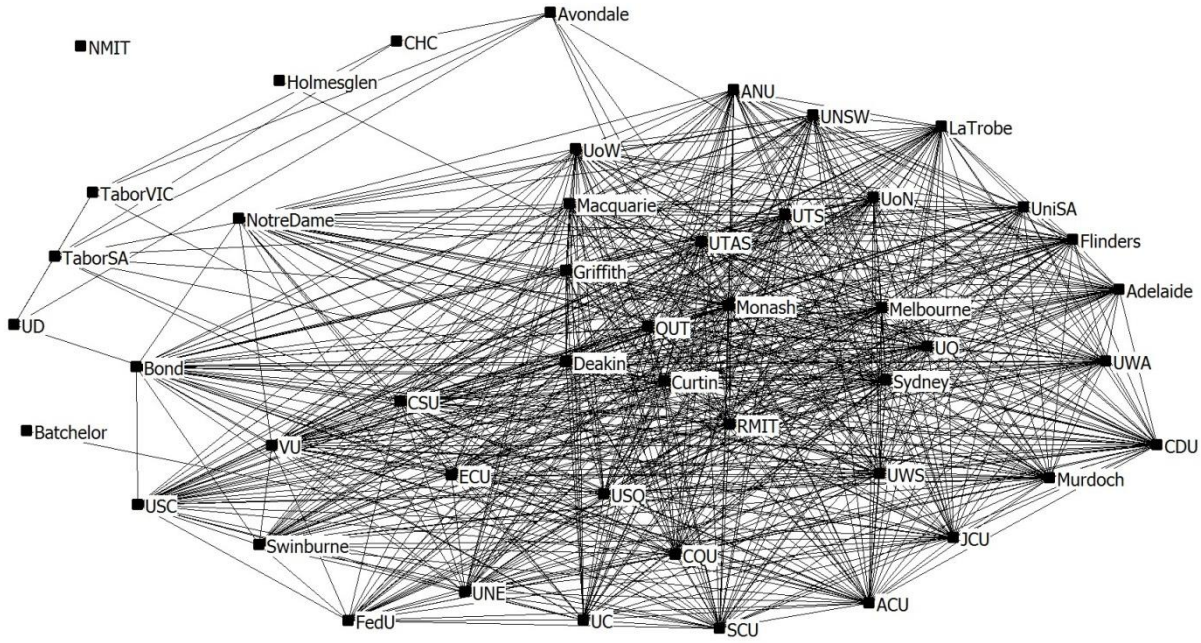

Figure 2: Valued ties network diagram

Discussion

This study explored the shape and structure of institutions' collaborative involvement through Carrick/ALTC/OLT project funding. 458 projects were analysed using social network analysis (SNA), with three questions addressed. The first was: *To what extent have institutions collaborated with each other?* The SNA density results suggest that, overall, institutional collaboration has been quite high. However, a tendency existed for Table A providers to collaborate with one another, and not with the 'other' institutions eligible for direct funding.

The second question was: *Are some institutions more involved than others in collaboration?* The answer to this question is 'yes.' The University of Queensland and The University of Sydney had the strongest collaborative relationship, but neither of these institutions was the most central actor. SNA centrality scores showed that the Australian Catholic University (ACU) is the most central at the binary level. This is due to the ACU's collaboration with the smaller 'other' institutions and most likely related to a theology studies connection. The Queensland University of Technology (QUT) was the most central at the valued level.

The third question investigated was: *Do cliques or sub-groups exist within the projects funded?* Although no specific cliques were found, two sub-groups existed. Further, these two sub-groups aligned with two institutional associations in Australia: the Australian Technology Network (ATN) and the Group of Eight (Go8). This suggests that, while

Carrick/ALTC/OLT did encourage institutional collaboration, there has been a tendency for some institutions to favour project participation with fellow associated members. But as not all members of these two associations are present in the two identified sub-groups, it also suggests that some institutions within these associations have been more involved than others in projects related to learning and teaching.

Overall, the results of this study suggest that Carrick/ALTC/OLT has been successful in relation to its fourth value and principle for action: "Collaboration - through the programs it funds and in its work practices." The results indicate that the funding body has fostered collaboration on a national scale and supports the ALTC's (2011) claim that "by offering cross-institutional funding for projects involving more than one institution, the ALTC enabled work to be undertaken on a national scale (p.8)." However, the results also suggest that the collaborative encounters have not been uniformly distributed amongst institutions eligible for direct project funding by the body. While most of the Table A providers have collaborated with one another many times, the 'other' providers have had little collaborative involvement — neither with each other nor with Table A and B providers. This may be due to these institutions having fewer study offerings, thus resulting in fewer projects in which they can be involved with. But given that some of these institutions have been in the set for 13 years and have participated in five or less projects over this period, one might have expected to see slightly more project involvement over time. It might be that their project involvement is limited by their networking capabilities (e.g., by not being a member of an association) or their project proposal capabilities (e.g., designing and proposal writing). These institutions, for example, might have collaborated on proposals that were unsuccessful for funding. As this study has only examined funded projects as its data source, these explanations cannot be explored, but should be in the future.

The results of this study suggest that these 'other' institutions have not participated in many learning and teaching projects, which is unfortunate as they have probably not benefitted from Carrick/ALTC/OLT funding. Although they may have been on projects as an observer institution, participated in project dissemination workshops or engaged with other project materials, they have probably been excluded from the capacity building and kudos that comes with formal project participation. From a policy perspective, this might need to be addressed in the future so that those institutions currently on the periphery are better linked to the 'main' body. This could be addressed by a number of strategic projects or some more generic ones, where a lack of specific disciplinary offerings is not an excluding participation factor. It might even be possible to create a number of strategic projects where project membership is allocated. This of course assumes that these periphery members have the desire to participate in projects, which is not known.

Throughout this paper, the term 'other' has been used to refer to these periphery institutions, which is short for the funding body's official term of 'other providers.' Given the results of this study, a new name for this grouping should be considered by the soon-to-be-formed OLT replacement institute. Encouraging participation with these institutions should also be more strongly emphasised by the new body, if more uniform project participation is desired.

In terms of future research directions, a study similar to this one should be carried out on unsuccessful project proposals. This will help to determine the extent to which some institutions have been collaborating, but have been unsuccessful in attaining funding for their proposed projects. Interviewing key persons in these institutions might also help to better understand their under-representation. Interviews could also be held with persons at QUT, as

it is unknown why this institution is the most central at the valued tie level. It is also unknown why certain institutions (e.g., The University of Queensland and The University of Sydney) had strong partnerships. Are these partnerships the result of institutional affiliation support (e.g., through the Go8 or ATN)? Or are they the result of factors such as disciplinary research tie ups, and presence or strength of support for learning and teaching through centres? A closer inspection of these strong institutional partnerships is needed.

Future research should also consider looking at collaborative involvement over time. This has not been investigated in this current study due to space constraints. Finally, the impact of project collaboration should also be further investigated. This study evaluates an aspect of impact. It shows the effect that the funding body has had on the Australian HE landscape through its project funding. These collaborative instances have arisen through the body's operational strategies, which have clearly been effective in bringing most institutions together to work on projects. But what has been the impact on institutions collaborating on various projects? This should be explored in the future to better evaluate impact.

Summary

Since 2005, the Australian Government has funded learning and teaching projects in the Australian HE sector through a specific body (Carrick/ALTC/OLT). For all its successes and scholarly work produced as a result of this body's project funding, little research attention has been directed towards the funding body itself and what it has facilitated. Consequently, insights about this organisation and its impacts on the Australian HE community remain largely unknown. This study has sought to contribute to this perceived gap by investigating the shape and structure of institutions' collaborative involvement through Carrick/ALTC/OLT project funding. Overall, the results suggest that the body's funding has created a mostly well-connected network of institutions. Some institutions, however, were found to be 'hanging off' the edge of the network structure, which might need to be addressed by new policy and better understood by further research.

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