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Data Journalism Classes in Australian Universities: Educators Describe Progress to Date

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Kayt Davies & Trevor Cullen

Abstract

This article examines the extent to which data journalism (DJ) is being taught in Australian universities. It presents the results of interviews with 35 journalism academics about how they are incorporating data journalism into their courses. It includes details about the types of data journalism skills they are teaching, the resources they are using and the hindrances that have met or are making it difficult to teach data journalism. These hindrances include low and varied levels of quantitative literacy and math aversion among students, lack of time for upskilling and limited room in their courses for new material. The study found that at least nine Australian universities have semester-long units dedicated to data journalism and that at least a further nine are teaching it via some lectures and activities. Almost all respondents thought more should be done to incorporate data journalism into the curricula. This article lays a foundation for future exploration of how data journalism could be incorporated into journalism programmes where the staff requires upskilling.

Keywords

Data journalism, numeracy, quantitative literacy, journalism education

Introduction

While newsrooms worldwide are coming to terms with the potential and practicalities of data journalism (Appelgren & Nygren, 2014; Gray, Bounegru & Chambers, 2012; Knight, 2015), in what has been dubbed 'the era of big data' (Lewis, 2015, p. 322), journalism academics are monitoring the situation in a number of countries and reporting on the changing practices (Lewis, 2015). They are noting the emergence of different ways of incorporating data journalism into newsroom work (Uskali & Kuutti, 2015) and arguing the importance of doing so (Coddington, 2015).

Themes emerging from this work include recognition that DJ is an essential part of contemporary news work. As Fink and Anderson (2014, p. 467) put it: 'Data journalism, it appears, is everywhere. At least, it is everywhere if one looks primarily at the in-progress academic literature and at the online buzz over new developments in digital news production.' The emergence of different subspecies of DJ in newsrooms has been noted, with some focused on the presentation of numeric information via infographics and some more focused on the challenge of extracting meaning from large and often unwieldy data sources (Knight, 2015). While a comprehensive content analysis of DJ in the Australian media has not yet been undertaken, *The Guardian*'s Data Blog1 which shows Australian content in Australia and *The Sydney Morning Herald*'s Data Point2 are among the leaders in the field. In addition to noting the emergence and types of DJ being practised, researchers have started to investigate obstacles to the practice of data journalism (Appelgren & Nygren, 2014; De Maeyer, Libert, Domingo, Heinderyck & Le Cam, 2015).

De Maeyer et al. (2015) mapped the field of discourse about DJ in Belgium and found that while it was very much a topic of discussion, the practice was patchy. One of their interviewees said: 'Some of us are talking about it. But few really put that into practice. And it's mostly individual initiatives, emerging from the will of some journalists who decide to invest themselves in that' (p. 437). Appelgren and Nygren's (2014) study of DJ in Sweden described a similar situation. 'The main challenges facing the working methods of data journalism today are a shortage of time and the need for training and developing data journalism skills' (p. 394). In a study that also points to a limited uptake of DJ, Knight's (2015) content analysis of the UK media found that

> while superficial data journalism is being practised, it is limited in scope and format … Data journalism is practised as much for its visual appeal as for its investigative qualities, and the overall impact, especially in the tabloid format is as much decorative as informative. (p. 55)

These studies documenting inertia in the adoption of investigative DJ practice, despite enthusiastic rhetoric, highlight the importance of education and training of existing and new journalists.

According to De Maeyer et al. (2015), the incorporation of DJ into journalism curricula is a significant indicator of its ascendancy. They cite Anderson (2013) who described the front runners in DJ education in the US, writing:

> Leading educational institutions in the field of journalism education have taken notice of the computational journalism trend. In 2007, Georgia Tech University began teaching classes on 'computational journalism' … Since 2008, Northwestern University's Medill School of Journalism has, with support from the Knight Foundation, funded a small cadre of 'people with strong technology skills who are interested in pursuing a journalism master's degree' … while Columbia University's Graduate School of Journalism is aggressively touting its new five-semester journalism/computer science joint degree. (p. 1006)

In addition to these courses, organizations/online resources such as Poynter.org, datadrivenjournalism.net and hacks/hackers.com offer some guidance. While DJ is new it makes sense for there to be front runners and not-for-profits providing extra-curricular support. However, if it becomes a standard element of journalism work then it seems logical that some DJ skills could be embedded in most, if not all, tertiary journalism courses. This begs the question, is it? And, if so, how? What kinds of DJ skills and theory are being taught? And, what hindrances are being encountered? Berret and Phillips (2016) addressed this question with a study of 50 teachers and practitioners and 113 US university programmes and concluded that 'little more than half' of their sample regularly offered DJ classes and that less than 15 per cent offered more than three classes in it. While DJ's rise to fame has been relatively recent the inclusion of numbers in journalism is not new. As Huff wrote in 1954:

> Statistical methods and statistical terms are necessary in reporting the mass data of social and economic trends, business conditions, 'opinion' polls, the census. But without writers who use the words with honesty and understanding and readers who know what they mean, the result can only be semantic nonsense. (p. 10)

This reality has resulted in the incorporation of some statistical content in some journalism courses over the years, but there is little to no documentation of what, where, how much and how it is changing in the light of DJ. In addition, a persistent thread of research has been pointing to a dearth of this type of content in tertiary communications courses over several decades (Green, Shearn & Bolton, 1983; Maier & Curtin, 2004; Meyer, 1973).

In an article about how quantitative literacy is being taught in Australian universities, Galligan (2013) said there was a severe shortage of baseline data. Quantitative literacy is broader than just mathematical or numeric ability in that it encompasses the understanding of research methods and the limits to meaning that can be drawn from data gathered and analyzed. Galligan's article also raised the issue of math aversion, described as a result of early differentiation of people into maths versus non-maths people. While her article is important because it is about quantitative literacy training in Australian universities, it is of limited use in the context of journalism education because it took a whole-university approach and did not focus specifically on communications programmes or journalism. Dunwoody and Griffin (2013) did focus on journalism and found that both students and staff in the US tertiary journalism programmes tended to be math averse and that this was resulting in diminished confidence on the part of the heads of schools in their staff's capacity to teach quantitative literacy. Davies (2014) found that little academic work was being done in Australia to document and develop quantitative literacy or numeracy in communications education.

While informal conversations at conferences of the Journalism Education and Research Association of Australia (JERAA) have provided anecdotal indications of recent incorporation of DJ into Australian journalism courses, it is yet to be academically documented. This article presents the results of a series of interviews with 35 Australian journalism academics about how they are incorporating DJ into their curricula.

Methodology

We began with a list of 33 universities that Tanner, O'Donnell, Cullen and Green (2014) identified as claiming that their undergraduate degrees prepare students for careers in journalism. To this we added the University of Melbourne which has a post-graduate journalism course. Using the JERAA membership list as a starting point for finding contacts in those universities and supplementing this (where required) with phone calls to the heads of schools, we contacted relevant academics from all 34 universities. We started with face-to-face, semi-structured interviews based on five questions. We conducted 15 of these interviews. Coding the data as we went, we noticed patterns emerging and evolved the five questions into a questionnaire format to enable clearer

collation and comparison of the responses. The 15 were then re-contacted to ensure that they had been asked all of the questions in the new format. Further, 20 interviews were conducted by telephone.

Overall, academic staff from 25 universities answered all five questions. In some cases two or three staff members from a university responded in order to provide answers about the content in different units within their degrees. In others, one was able to answer for the whole programme. In all, we spoke to 35 journalism academics engaged in teaching DJ (20 female/15 male). The staff at three universities said the journalism components of their courses were too small to warrant their participation. We received no responses from six of the 34 universities. For simplicity in presenting this data the responses from the 35 academics we spoke to are grouped by university, meaning n = 25 in the following data summaries.

Results
1. Is DJ being taught and could it have been taught better?
The first question asked if DJ was taught at their university at undergraduate and/or postgraduate level based on a four-point scale:
- A whole unit or more, or equivalent spread across a number of units ('unit' meaning one quarter of a full time student load for a semester).
- Some lectures and activities specifically on DJ but less than a whole unit overall.
- Some mentions in some lectures.
- It is not mentioned or taught (in some cases due to the university having no post or undergrad journalism coursework).

The results shown in Figure 1 indicate that just over a third (36 per cent) of the 25 universities offer a whole unit and 72 per cent have at least some lectures and activities dedicated to it.

The academics were then asked if they aspired to include more DJ in their programmes or if they were content with how they were teaching it.

Respondents from 16 universities said yes, using phrases like:
- 'We definitely need and hope to do more';
- 'We would love to teach it and recognize the need to'; and
- 'Our new unit is under development.'

Three responded that they would 'love to' but:
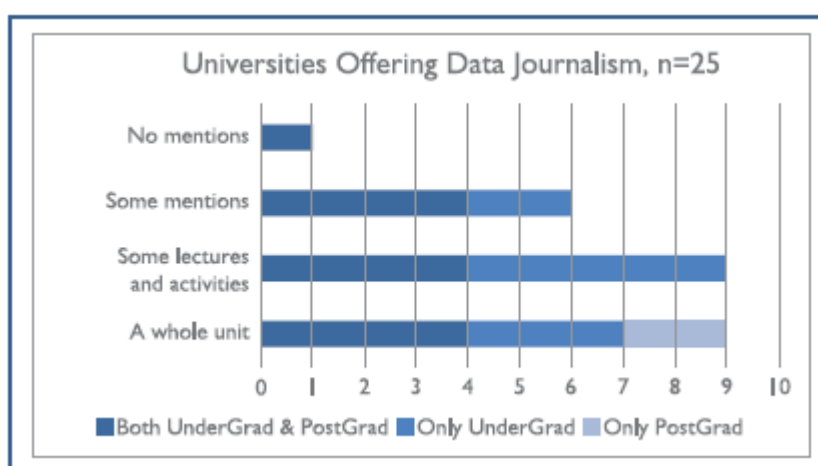- 'Not possible in the scope of this degree'; and
- 'Can't fit it in.'

Figure 1. Number of Universities Offering DJ Classes to Undergraduate and Postgraduate Students
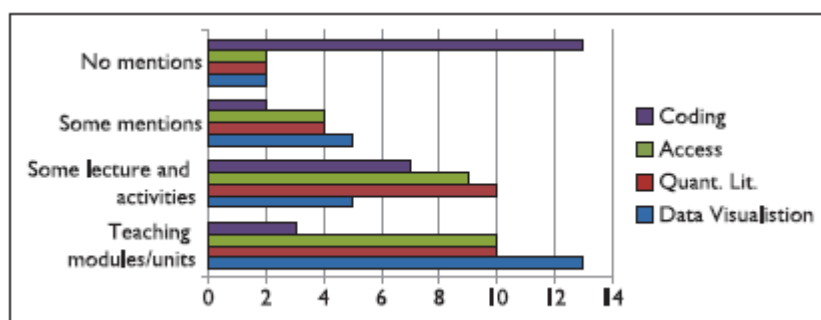**Source:** Authors' own.

Figure 2. Number of Universities Teaching Each Type of Data Journalism
Source: Authors' own.

Respondents from five universities expressed satisfaction with their current DJ teaching. Of these, two had recently launched new units and two added phrases such as 'but we are prepared to move with the industry' and only one said she did not think that specialized teaching of DJ was necessary. She said: 'We embed that kind of thing in a broader structure, it is simply one part of the bigger picture and it would come under research methods.' These responses indicate almost unanimous agreement that DJ is a challenging and moving space in journalism education.

2. What kind of DJ is being taught?

To gain greater clarity about specifically what is being taught and how much of it, DJ as a construct was divided into four skill sets. The journalism educators were asked to rate how much of each they were teaching. Figure 2 shows their responses. The four skill sets were described as:

> Data visualization, including how to tell stories using maps, timelines and other infographics.
> Quantitative literacy, including understanding sampling techniques and concepts such as descriptive and predictive statistics, significance and error margins.
> How to access data not obviously in the public domain.
> Coding and extraction of meaningful information from big data.

The results indicate that data visualization is being taught in some lectures and activities, or in modules or units, in 72 per cent of the responding universities and it gets some mentions in further 20 per cent, leaving only 8 per cent (two universities), not teaching it. Quantitative literacy is being taught in some lectures or entire units in 80 per cent of the responding universities with some mentions in further 16 per cent, again leaving only 8 per cent, not teaching it. How to access data not obviously available in the public domain is being taught in some lectures or entire units in 76 per cent of the responding universities, with some mentions in further 16 per cent, again leaving only 8 per cent, not teaching it.

Coding and extraction of meaningful information from big data are only being taught in some lectures and activities or in modules or units in 12 per cent (three) of the responding universities, with some mentions in further 28 per cent and 52 per cent (13 universities) not teaching it. However, of the affirmative answers only three universities said that they were actively teaching coding. Others used qualifying comments such as:
> • We teach some data scraping.
> • We turn raw data into spreadsheets, but we do not write coding or algorithms.
> • There is a bit in the new unit.
> • We are just starting to play around with it.
> • We are showing them how to use data scrapers and how to tweak the code a bit to get what they want.

3. What resources are being used?

Academics representing 12 of the 25 universities said they were not using a text. Respondents from 4 of the 13 universities that did use texts said they were using all or part of The Data Journalism Handbook (Gray et al., 2012); respondents from 4 universities said they used readers or selected journal articles; 3 mentioned Journalism Research and Investigation in a Digital World (Tanner and Richardson, 2013); and the four texts listed below were each mentioned by only 1 respondent.

- *The Hidden Web* (Henninger, 2008).
- *How to Lie with Statistics* (Huff, 1954).
- *Media and Journalism: New Approaches to Theory and Practice* (Bainbridge, Goc & Tynan, 2015).
- *Online Journalism Handbook* (Rohumaa & Bradshaw, 2011).

The second part of this question was what programmes and apps they were using and this yielded a list of 31 pieces of software (see Table 1) with some overlaps and some appearing only once on the list. In addition to the programmes and apps listed, one said she used in-house software and academics from three universities said they encouraged students to 'explore apps' or 'find their own consumer representation tools'.

The final component of question three asked if they were outsourcing any of their teaching. This question arose from Davies' (2014) article on outsourced teaching software use in a blended teaching pedagogy. Respondents from 19 of the 25 universities said they used no outsourced teaching. Respondents from 6 universities said their university had subscribed to Lynda.com and that students could use it to learn software they were unfamiliar with. Their rationales included:

Table 1. Programmes and Apps Being Used to Teach Data Journalism in Australia in 2016

Program/App /	Universities	Description Used for
Excel	14	Spreadsheets and analytics and data visualization
Tableau	10	Data visualization and analytics
Piktochart	5	Data visualization
Google	3	Search engine
Google Fusion 2	2	Data visualization
Infogr.am	2	Data visualization
Leximancer	2	Text mining software
Photoshop	2	Photo editing and data visualization
Open Refine/Google Refine	2	Data cleaning
Adobe CC suite	1	Multimedia data visualization
Datawrapper	1	Data visualization/simple embeddable charts
Easel.ly	1	Data visualization
Nvivo	1	Qualitative data analysis
Gephi	1	Open Source data visualization
Google My Maps	1	Custom mapping
Google trends	1	Source of Trend Data
Illustrator 3D	1	3D Illustration
Kimono	1	Data scraping
KnightLabs	1	Timelines and Story maps
Mapbox	1	Custom mapping
Mapstory	1	Custom mapping
Newsmap	1	News aggregator
OutWit Hub Pro	1	Data scraping
Silobreaker	1	Data analytics and visualization
TerMine	1	Text mining software
Trend maps	1	Twitter aggregator
Venngage	1	Data visualization
Visual.ly	1	Multimedia data visualization

Source: Authors' own.

'Students come with such disparate levels of proficiency, so they can dip into the tutorials on Lynda.com when they get stuck'; and 'they need to have proficiency with basic Excel before they come to the class, so they must do the Lynda.com Excel 5-Day Challenge before the semester starts.'

While not using the term 'outsourced teaching', respondents from six universities mentioned resources they used to demonstrate and explain some points. They were:

- Steve Doig's Doing Journalism with Data
- Codecademy.com
- BBC Academy
- SMH Data Point
- The Guardian Data Blog
- Data Driven Journalism

4. Explored staffing issues, skill levels and upskilling.

Only one respondent said that the existing staff at her university had been skilled enough to teach DJ and it is worth noting that this was the only university that did not think that specialized teaching of DJ was necessary. Respondents from the other 24 said that they had either upskilled, were in the process of doing so or in need of it. All of the staff who said that they had upskilled also said that upskilling was an ongoing process. Respondents from six universities seemed fairly positive about the process, making comments such as:

- We are all still active as professionals and that gives us iterative feedback. Upskilling is just part of what we do.
- I don't have formal training but I am picking things up as they come out, actively working on doing that and using expertise from within the faculty.

However, respondents from 12 universities flagged that it was a major problem, using words like 'hard' and 'difficult' and adding comments such as:

- The greatest impediment is the lack of skills of the staff.
- One student even said in the official feedback on the unit: 'It's a bit off putting when even the lecturer is struggling.'
- Academics are not comfortable teaching it because they do not have a lot of experience with it. We are in a no man's land where we do not really know how to teach this.

Respondents from 5 universities specifically mentioned that finding time for upskilling was difficult:

- Upskilling and doing well but finding time is a difficulty.
- It is difficult for the staff to find time to upskill themselves.
- The challenge of finding time to upskill.
- Definitely upskilling, especially in the teaching side of it and the complex functions in Excel. Hard to work out what it is worth time to upskill in.
- It is hard as the teacher because you have to keep upskilling and you have to keep checking that the software you are using still works, especially free online software. So there are technical limitations to how well we can do this, while we are also doing everything else.

Some spoke about solving this problem by seeking expertise. One in a hopeful vein with: 'It would be good to be able to bring in an external expert to teach it for a while. It wouldn't have to be a permanent arrangement because it would allow the staff to upskill by taking part in those classes.'

Another documented assistance the university had funded: 'We brought Brant Houston to Melbourne to give four professional development sessions to all journalism staff. In addition, one staff member did a Massive Open Online Course (MOOC) led by Steve Doig to upskill.' And another reflected on having employed an expert to run a summer course with: 'We brought him in four years ago because the other staff did not have the expertise to teach it. If we lost him, it would be difficult, but a growing number of people can teach it now.' One also flagged that her problem was that not all lecturers wanted to master these skills: 'I had to upskill and I'm not really having difficulties, but it's hard to get my colleagues on board as they don't really want to engage.' And another made the pointed remark: 'While individuals may be upskilling, there has been no support provided for this.'

Respondents from only four universities said they had been able to bring in external experts to teach DJ. These arrangements included: using sessionals with professional experience; inviting expert practitioners in as guest lecturers; using expertise from elsewhere in the university; and, in one case, paying an expert practitioner to run a summer school unit. Respondents from only three universities said DJ was not being taught by either the existing or new staff. One was the university with the summer school unit and at the other two it was not taught

beyond mentioning it in some classes. This means that in most cases it is being taught by the on-staff academics. At two of the remaining 22, it is being taught by the new staff recruited because of this specific expertise. At further two, the new staffs have been recruited to help upskill the existing staff:

- The unit has three tutors, so this year we had two existing tutors being led by a new one because the existing staff struggled with it.
- We recruited him specifically to do the job. Respondents from two universities described themselves as lucky to have specific experts in their ranks. This leaves 16 of the 25 universities where the existing staff are teaching it, without new or external help, and managing their upskilling learning curves with varying degrees of success and frustration.

5. Hindrances to the process of incorporating data journalism into journalism curricula.
As described earlier, we began our research process with semi-structured faceto- face interviews. Respondents were asked an open-ended question: What, if any, hindrances are making it difficult to teach DJ. Coding the early data the responses fell into five categories, which were later put to all respondents:

- Students not skilled enough (in math/numeracy and/or quantitative literacy)
- Students are math averse
- Limited number of assessment points
- Course too full
- Other

Students not skilled enough: Respondents from 11 of the 25 universities said students' low levels of mathematical and quantitative literacy skills made teaching DJ difficult and further seven concurred but added that it was the variety of skill levels that made the teaching difficult. Two more added that initial low skill levels were to be expected. Describing the problems they said:

- We have to find workarounds like online percentage converters.
- I need to teach some very simple math and explain that doing this is part of the bread and butter of basic reporting, but it is time intensive and students are time poor.
- I am just not sure the students get it.

Their comments about mixed skill levels included:

- Very mixed baseline skill levels.
- It is the variety, some could teach the class but others cannot do a multiplication formula.
- Yes, there was a mistaken assumption that millennials were digital natives and would come to us with all sorts of skills, but their skill levels are very mixed.

The comments about it being a part of teaching were:

- I do not see it as a problem as it is my role to train them.
- Their skill levels are low but I just work with it.

Respondents from five universities said low student skill levels were not a problem. Students are math averse: Respondents from 22 of the 25 universities stated that math aversion among students was a problem. Of those 22, respondents from 11 universities said that while it was an issue, dealing with it was part of teaching.
• It takes a lot of time convincing them that they can do this without being particularly mathematically literate.
• The challenge is getting them to pay attention once you mention the numbers. They are arts students because they do not feel confident about math. • I am not sure that they will all go and work as data journalists but studying some DJ will make them better journalists. It is about making them comfortable with numbers and understanding that there are numbers at the heart of almost every story. Their comments about having to address it included:

- I literally had students saying I am doing journalism because I am good at writing not math. I realized we had to take it much more slowly, introduce it gradually. There is definitely a barrier there, but it is not insurmountable.
- We have to work on getting them to see the story.
- Some are very anxious, we need to change the view about how important it is—and to introduce the idea of collaborating with others with more skills once they understand the issues.

The comments describing the problem included:

- There are problems with finding ways to make the cycle of feedback work. They get tasked with it, but they can find ways to avoid it.
- We are being asked to constrain assessment points and this makes it hard to include more content.
- Yes, because some students will simply skip the assignments that are not worth many marks.
- Students are keen to find ways to cut corners and avoid parts of their assessments; they avoid anything that requires a time investment.

Course too full: Several of the first 15 respondents raised that it was hard to fit DJ into their courses because there was so much other content that also needed to be included. When we had all of the data their responses, shown on Table 2, fell into 5 clusters that showed that respondents from 24 of the 25 universities had or were finding it hard to fit more content into their already full courses.

Other: The final part of question five was an open-ended question that allowed respondents to add any burning issues they felt we had neglected. Most of their comments were expansions of earlier comments about the staff's skill levels and math aversion and were moved to those sections for analysis. Five raised the need

Table 2. Number of Universities Experiencing Each Type of Difficulty Fitting Data Journalism into Their Courses

It is hard to find space in the course for DJ	13
It was hard, but we have revised the curriculum to make room	7
It is hard, but we are in the process of reshuffling to make room	3
It is hard because we have limited lab space	1
Not a problem	1
	n = 25

Source: Authors' own.

to find a balance between technical skills and nurturing curiosity and narrative skills with comments such as:
- It is important not to focus too much on tech skills. It is better to think about what kind of story you can find and tell and develop that skill.
- We have to be careful that we do not overemphasize coding and lose sight of the journalistic focus on finding the story and telling the story.
- We need to find the narrative in the numbers.
- It is definitely a challenge, but not the hardest aspect of teaching journalism Inspiring a student to be curious about the world can be a bigger challenge. It is a bit of a grind but if it is taught well they can get enthusiastic.

The last respondent offered some sage advice with the words:
- Expectation management is an issue for all of us. We have to be mindful of what we can do with what we have.

Discussion
While 35 academics from 25 universities is a good sample size, caution should be taken in assuming that an answer given by half of our respondents would indicate what is happening in half of the universities teaching journalism in Australia. Our sample may be biased toward the universities doing most with DJ, as they are more likely, than universities taking no action, to have staff keen to talk about it. That said, the sample is large enough in its own right to indicate that a substantial proportion of universities are taking action. We have shown that 18 universities have at least some lectures and class activities aimed at teaching DJ, while these may be representative of a larger group they may also be the only 18. While this suggests that incorporation of DJ into journalism education curricula is underway, the bumpiness of the road is evident in the responses from 19 of our 25 universities saying that they would like to do more if they could, especially with most of the others not disagreeing but instead being front runners who have recently added content to their programmes. This affirms DJ's place amongst the current hot topics in journalism education in Australia.

Our second question was inspired by Knight's (2015) content analysis that distinguished visual/decorative DJ from investigative DJ. We were also interested in the connections between what are perceived as new DJ skills and the skill set that has been described by Dunwoody and Griffin (2013) and Galligan (2013) as quantitative

literacy. Our results resonate with Knight's (2015) content analysis of DJ in the UK media that showed that the vast majority of DJ being published was at the visual/decorative end of the scale. Our study found that the same goes for most of the DJ being taught. While 13 of our universities had the equivalent of a unit dedicated to teaching data visualization, only three said they were teaching students how to write code to extract meaningful information from data to the same extent. Teaching quantitative literacy skills was more common than Dunwoody and Griffin (2013) suggested it would be with 20 universities saying they either had units or some lectures in it. While these attempts indicate that math aversion among the staff may not be as pronounced as Dunwoody and Griffin (2013) indicated it could be, it is again worth noting that our respondents may be the least math averse journalism educators in Australia. The fact that these classes are offered also does not presuppose their success. More than two-thirds of our respondents said that low or varied skill levels amount students made teaching and DJ skills difficult and 88 per cent of them said that their students were math averse and that this required classroom time and effort to counteract.

Respondents from 19 universities told us they were teaching students to access information not readily available. In discussing this question with them, many lecturers answered affirmatively because they were teaching students about freedom of information requests and other traditional research skills. More research is required to tease out whether many or most of them are also teaching students newer ways to access information on the hidden web such as use of search engines other than Google, compiling data using the Wayback Machine and other more advanced techniques.

During our interviews it became clear that the universities with particularly qualified or experienced individuals on staff were able to do far more than other universities. These experts include University of Melbourne's sessional Craig Butt, who is also a co-founder of the Melbourne chapter of Hacks/Hackers; University of Technology Sydney's Maureen Henninger, who has written about the hidden web (Henninger, 2008); and Charles Sturt University's Isabel Fox, who as a former computer programmer, can teach students how to write code. This resonates with Maier and Curtin's (2004) assertion that when numeracy was taught well in tertiary communications programmes it was predominantly the work of inspired individual lecturers, as opposed to being a universally valued inclusion in the curricula. Despite this older trend, and perhaps indicating the pressure being placed on journalism educators by industry demand for graduates with DJ skills, this study indicated a relatively high level of action on including DJ (albeit mostly at the visual end of the scale) by universities both with and without access to expert staff.

Many of the lecturers we spoke to were struggling to fit the work into their course structures that in many cases limit the number of assessments they are funded to mark and how much they can change the courses they are teaching. This suggests there is contention within universities about how important DJ skills are compared with other media production skills. While the respondents demonstrated admirable resourcefulness in listing programs, apps and resources that they have found to use in their teaching, almost all said that upskilling was or has been required in order for them to be able to teach DJ and many said that this has not been an easy process.

In conclusion, this research presents a snapshot of how DJ is being taught in Australian universities in early 2016. In doing so it lays a solid foundation for future research to delve deeper into the issue, to explore what specific skills and techniques the front runners in this space are teaching and how they have overcome the hindrances such as low and varied baseline skill levels, math aversion and time pressure on upskilling. Future work could also create resources to assist the universities lagging behind in Australia and the wider Asia-Pacific region.

Notes
1. Retrieved 19 September 2016, from www.theguardian.com/data
2. Retrieved 19 September 2016, from www.smh.com.au/data-point

References
Anderson, C.W. (2013). Towards a sociology of computational and algorithmic journalism. *New Media & Society*, *15*(7), 1005–1021. doi: 10.1177/1461444812465137

Appelgren, E., & Nygren, G. (2014). Data journalism in Sweden: Introducing new methods and genres of journalism into 'old' organisations. *Digital Journalism*, *2*(3), 394–405. doi: 10.1080/21670811.2014.884344

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Bainbridge, J., Goc, N., & Tynan, L. (2015). *Media and journalism: New approaches to theory and practice* (3rd ed.). Melbourne: OUP.

Berret, C., & Phillips, C. (2016). A crucial skill that most J-schools aren't teaching. *Columbia Journalism Review*. Retrieved 19 September 2016, from http://www.cjr.org/analysis/data.php

Coddington, M. (2015). Clarifying journalism's quantitative turn. *Digital Journalism*, *3*(3), 331–348. doi: 10.1080/21670811.2014.976400

Davies, K. (2014). Evaluating an online numeracy tutorial program for use with journalism students. *Australian Journalism Review*, *36*(1), 69–84.

De Maeyer, J., Libert, M., Domingo, D., Heinderyck, F., & Le Cam, F. (2015). Waiting for data journalism. *Digital Journalism*, *3*(3), 432–446. doi: 10.1080/21670811.2014.976415

Dunwoody, S., & Griffin, R.J. (2013). Statistical reasoning in journalism education. *Science Communication*, *35*(4), 528–538. doi: 10.1177/1075547012475227

Fink, K., & Anderson, C.W. (2014). Data journalism in the United States: Beyond the 'usual suspects'. *Journalism Studies,16*(4)*,467–481.* doi:10.1080/1461670X.2014.939852

Galligan, L. (2013). A systematic approach to embedding academic numeracy at university. *Higher Education Research and Development*, *32*(5), 734–747. doi:10.1080/07294306.2013.777037

Gray, J., Bounegru, L., & Chambers, L. (2012). *The data journalism handbook.* Sebastopol, CA: O'Reilly.

Green, J., Shearn, D., & Bolton, N. (1983). A numeracy course for arts undergraduates*. Studies in Higher Education*, *8*(1), 57–65. doi: 10.1080/03075078312331379121

Henninger, M. (2008). *The hidden web: Finding quality information on the net* (2nd ed.). Sydney: UNSW Press.

Huff, D. (1954). *How to lie with statistics*. London: Victor Gollancz Limited.

Knight, M. (2015). Data journalism in the UK: A preliminary analysis of form and content. *Journal of Media Practice*, *16*(1), 55–72. doi:10.1080/14682753.2015.1015801

Lewis, S. (2015). Journalism in an era of big data. *Digital Journalism*, *3*(3), 321–330. Retrieved from http://dx.doi.org/10.1080/21670811.2014.976399

Maier, S.R., & Curtin, P.A. (2004). Self-efficacy theory: A prescriptive model for teaching research methods. *Journalism and Mass Communication Educator*, *59*(4), 351–364.

Meyer, P. (1973). *Precision journalism: A reporter's introduction to social science methods*. London: Indiana University Press.

Rohumaa, L., & Bradshaw, P. (2011). *The online journalism handbook.* London: Taylor and Francis.

Tanner, S., O'Donnell, M., Cullen, T., & Green, K. (2014). Graduate qualities and journalism curriculum renewal: Balancing tertiary expectations and industry needs in a changing environment. Retrieved 19 September 2016, from http://www.olt.gov.au/resourcegraduate-qualities-and-journalism-curriculum-renewal-balancing-tertiary-expectationsand-in

Tanner, S., & Richardson, N. (Eds). (2013). *Journalism research and investigation in a digital world*. Melbourne: OUP.

Uskali, T., & Kuutti, H. (2015). Models and streams of data journalism. *The Journal of Media Innovations*, *2*(1), 77–88. Retrieved 19 September 2016, from https://www.journals.uio.no/index.php/TJMI/article/view/882/1160