Students' use of Wikipedia as an academic resource - patterns of use and perceptions of usefulness

Abstract: Wikipedia is now an established information source in contemporary society. With initial fears over its detrimental influence on scholarship and study habits now subsiding, this paper investigates what part Wikipedia plays in the academic lives of undergraduate students. The paper draws upon survey data gathered from students across two universities in Australia (n=1658), alongside follow-up interview data from a subsample of 35 students. Analysis of this data suggests that Wikipedia is now an embedded feature of most students' study, although to a lesser extent than other online information sources such as YouTube and Facebook. For the most part, Wikipedia was described as an introductory and/or supplementary source of information – providing initial orientation and occasional clarification on study topics. While 87.5 per cent of students reported using Wikipedia it was seen to be of limited usefulness when compared with university-provided library resources, e-books, learning management systems, lecture recordings and academic literature databases. These findings were notably patterned in terms of students' gender, year of study, first language spoken and subject of study.

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1. Introduction

As many internet users will be aware, Wikipedia is an online encyclopaedia provided in an open format where users can create, amend and delete entries and information as they feel fit. Perhaps the most appropriate source of background information about Wikipedia is Wikipedia itself. Here we learn that (at the time of writing) 287 different language versions of Wikipedia have been established since 2001, with the original English-language version remaining the largest with over 4.6 million articles. The Anglophone version of Wikipedia hosts around 23 million user accounts and nearly 75,000 active editors. These figures are dwarfed by the usage statistics associated with Wikipedia. As the sixth most used website in the world, Wikipedia attracts over 18 billion page views and approaching 500 million unique visitors each month. In this sense, Wikipedia represents one of the largest and most recognizable reference resources of current times.

The role that Wikipedia plays in contemporary education has understandably become a topic of much debate and disagreement. On one hand, the educational value of Wikipedia has been welcomed by some educators. Wikipedia is seen as "a unique opportunity for educating students in digital literacy" (Okoli *et al*. 2014, p.2381). The website has also been heralded in terms of its democratization of knowledge creation (Konieczny 2014). As John Willinsky (2009, p.xiii) has argued:

> "Today a student who makes the slightest correction to a Wikipedia article is contributing more to the state of public knowledge, in a matter of minutes, than I was able to do over the course of my entire grade school education, such as it was".

In contrast, a variety of concerns have been repeated regarding the quality of information on Wikipedia – most notably its accuracy and scope (Denning *et al*. 2005), as well as the inconsistent ability amongst different groups of students to make discerning and critical use of Wikipedia content (Shen *et al*. 2013). Nevertheless, by the beginning of the 2010s Wikipedia was beginning to be seen as an accepted – if not wholly welcomed – feature of higher education. As Head and Eisenberg (2010, n.p) conceded:

> "Wikipedia meets the needs of college students because it offers a mixture of coverage, currency, convenience and comprehensibility in a world where credibility is less of a given or an expectation from today's students".

These debates need to be contextualised against the emerging empirical literature on the realities of students' digital technology use in education. Indeed, any discussion of

students' use of Wikipedia needs to be set as part of the wider literature on information-seeking behavior with electronic sources (e.g. Nicholas *et al.* 2009) – particularly other social media such as social networks, micro-blogs, content sharing and rating sites, social Q&As and so on. The burgeoning literature on students' uses of technology suggests that social media are part of a broad information landscape, with social media complementing printed resources, traditional mass media, friends and peers (Sin 2015). Research in this area has found key student concerns when using social media to include issues of credibility, authority, relevance and timeliness of information (Kim *et al.* 2014), with social media often used in initial phases of information seeking (Kierowski *et al.* 2015).

However, Wikipedia is perhaps best seen as a distinct source of information from other social media – as Kierowski *et al.* (2015, p.274) reason, "not all social media are equal". Whereas most social media act as sources of communication about information and/or the sharing of information, Wikipedia is based specifically on the collaborative production of long-form, original information. With its emphasis on continuous co-creation of information purporting to lead to crowd-sourced authenticity and accuracy, Wikipedia has understandably come to play a prominant role within everyday information seeking behaviors.

This is particularly important when making sense of how Wikipedia is used within higher education, where students are expected to be self-directed, and autonomous in their information seeking and information use. A handful of studies has begun to hint at the constrained role that Wikipedia plays in the academic lives of university students. Indeed, early studies have tended to report cautious attitudes amongst students toward using Wikipedia as anything more than a means of checking facts and providing background information (Lim 2009). Use has been found to be more prevalent in some disciplines – i.e. engineering, science and architecture – than others (Head & Eisenberg 2010). For most students Wikipedia is suggested to be a preliminary and preparatory source of information (Biddix *et al.* 2011), more likely to be used by students whose professors were perceived as (perhaps tacitly) endorsing its use (Lim 2013).

2. Research questions

As it approaches its fifteenth year, Wikipedia is no longer a novel and/or niche aspect of higher education - rather it is an unremarkable and established element of students' everyday internet use. To what extent, then, do the concerns of earlier commentators still hold true? Moreover, how has Wikipedia use settled as part of higher education study and leadership? From this perspective – and given the limited research carried out to date - the present paper addresses the simple, exploratory questions of how current generations of university students are engaging with Wikipedia during their academic studies. In particular, the paper will now go on to consider the following research questions:

- To what extent is Wikipedia being used - and valued as useful - by undergraduate students?

- How does Wikipedia use and usefulness vary between different groups of students e.g. in terms of subject disciplines, age and stage, gender, educational attainment, cultural and linguistic diversity and so on?
- What role can Wikipedia be said to play in the academic lives of undergraduate students?

3. Method

These questions are addressed through an analysis of survey data and follow-up group interviews collected as part of a larger study of digital technology use in universities. Data were collected during the 2014 academic year from students of two similarly sized and proportioned universities in Australia:

- University A - a public research-based university in the South-east of Australia. The university has five campuses with a current total enrolment of approximately 46,000 undergraduates, mostly taking on-campus courses. The university offers undergraduate and postgraduate degrees across ten main subject areas (in order of magnitude): Business and Economics (11,500 undergraduate students); Medicine, Nursing and Health Sciences (7500); Arts/Social Sciences (7400); Engineering (4250); Education (4000); Science (4000); Law (2500); Information Technology (2000); Pharmacy and Pharmaceutical Sciences (1400); Art, Design and Architecture (1250).

- University B - a public research-based university in the East of Australia. The university has five campuses with a current total enrolment of approximately 31,500 undergraduates, mostly taking on-campus courses. The university offers undergraduate and postgraduate degrees across four subject areas (in order of magnitude): Business and associated subjects (10,000 undergraduate students); Arts, Education and Law (9000); Health and associated subjects (7500); Science, Environment, Engineering and Technology (5000).

Development and administration of survey instrument

All undergraduate students in both institutions were invited to complete an online questionnaire containing items investigating their engagement with digital technologies. The survey took the form of a 48 item questionnaire, designed to take between 15 and 20 minutes to complete. Closed and open-ended items were updated and adapted from a number of previous surveys of student technology use (BCIT 2009, Kennedy *et al*. 2006, JISC 2008, Dahlstrom *et al*. 2013, Selwyn 2008). The questionnaire was piloted with a group of 30 undergraduates at a comparable higher education institution for sense and ease of completion. As the questionnaire items related to self-reports of personal information, behavior, and perceptions of usefulness (rather than batteries of items intended to measure attitude, confidence *etc.*), it was not considered necessary to validate the instrument. The questionnaire was administered online via the Qualtrics online survey application. The survey was promoted to students through email, faculty communications, on-campus print and online advertising.

Survey sample

The self-selecting sample of those students who chose to respond consisted of 1658 students with an age range of 17 to 66 (mean age=22.5, SD=6.9). As can be seen in Table One, the sample was varied in terms of academic performance, mode of study, domicile status and cultural and linguistic diversity, although there was an over-representation of female students (66.6 per cent in this study compared with 55.8 per cent nationally according to official statistics (Australian Department of Industry 2012), full-time students (92.9 per cent versus 70.3 per cent nationally) and those taking medicine (over-representation by 6 per cent), business (under-representation by 10 per cent) and science subjects (over-representation by 6 per cent).

Table 1. *Survey respondents by individual characteristics (n=1658)*

	n	per cent
Gender		
Female	945	66.6
Male	473	33.4
University		
University A (SE Australia)	1250	75.4
University B (NE Australia)	408	24.6
Year of study		
First	627	37.9
Second	395	23.9
Third	347	21.0
Fourth (and above)	287	17.3
Subject area		
Medicine (and allied subjects)	366	22.1
Sciences (physical and biological)	245	14.8
Engineering, computer science & maths	181	10.9
Business	275	16.6
Social sciences, economics and politics	132	8.0
Law	122	7.4
Humanities, languages and library studies	113	6.8
Creative arts and design	60	3.6
Education	162	9.8
Mode of study		
Full-time study	1321	92.9
Part-time study	101	7.1
Age group		
Mature aged (i.e. aged 21 years or more at entry)	288	20.5
Younger (i.e. aged 20 years or less at entry)	1119	79.5
Academic performance		
High distinction (equivalent GPA 4.0)	236	17.1
Distinction (equivalent GPA 3.0)	643	46.6
Credit (equivalent GPA 2.0)	410	29.7
Pass or lower (equivalent GPA 1.0 or lower)	91	6.6
Domicile status		
Domestic students	1258	88.8
International students	159	11.2
Employment status		
Working in paid employment while studying	916	64.4
Not working in paid employment while studying	506	35.6
First language		
English as first language	1195	84.3
Language other than English as a first language	222	15.7

Language spoken at home		
English only	1027	72.6
Languages other than English	388	23.4
Disability		
Student with no declared disability	1355	95.7
Student with declared disability	61	4.3
Indigenous background		
Aboriginal and/or Torres Strait Islander origin	11	0.8
Not of Aboriginal and/or Torres Strait Islander origin	1391	99.2

N.B. some totals do not add up to 1658 due to differing completion rates for each item.

Follow-up group interviews

Follow-up group interviews were then conducted with volunteer respondents from the survey sample. These interviews were based around group discussion of a standard set of ten open-ended questions, and lasted between 60 and 90 minutes. Each interview was conducted face-to-face by a member of the research team, audio recorded and transcribed *ver batim*. Five group interviews were conducted with groups of students following 'STEM' subjects (i.e. science, technology, engineering, mathematics) and 'non-STEM' subjects (i.e. arts, humanities, social sciences, business, law):

- undergraduate 'STEM' subjects (University A) – 8 participants
- undergraduate 'non-STEM' subjects – i.e. arts/ humanities/ social sciences/ business/ law (University A) - 7 participants
- undergraduate 'non-STEM' subjects (University A) - 4 participants
- undergraduate 'STEM' subjects (University B) - 8 participants
- undergraduate arts/ humanities/ social sciences/ business/ law (University B) - 8 participants

Analysis of data

This paper examines survey data relating to students' reported use and perceived usefulness of Wikipedia, alongside descriptions of this Wikipedia use arising from the open-ended questionnaire items and a series of five follow-up group interviews with 35 students.

Analysis of the survey data has to allow for the limitations of the self-selecting, non-randomized nature of the sample and the lack of complete measurement of all cases in the selected sample (De Vaus 2002, Gorard 2015). Significance tests and confidence intervals are therefore not presented in this report, because they are predicated on complete random sampling/allocation of a kind never encountered in real-life research and not available here (Berk and Freedman 2001). Anyway, these tests do not work as intended (Carver 1978), are almost always misinterpreted (Watts 1991), and can lead to serious mistakes (Falk and Greenbaum 1995). Above all, they take no account of sample quality or attrition (Lipsey *et al*. 2012).

The analysis of survey data therefore takes the form of frequencies and cross-tabulations of responses in terms of 'background variables, to represent the patterns of responses. Following this, the multivariate patterning of the data is explored via logistic regression based on effect sizes. For this we created a binary variable representing whether each respondent reported Wikipedia to be a 'useful' element of their academic work (i.e. reporting Wikipedia as 'useful' or 'very useful') or not. We then used this as the dependent variable in a binary logistic regression analysis using all of the personal characteristic variables in Appendix One as potential predictor variables. Logistic regression relies on far fewer assumptions about the data than alternatives such as linear regression or discriminant analysis, and makes the use of categorical predictor variables considerably easier (Gorard 2003).

The model of finding Wikipedia useful (or not) was created in three stages, using backwards stepwise selection of the variables for each stage. In the first stage, variables were added that could be known about the individual from birth (age, gender, ethnicity and so on). In the second stage, variables were added about the students' current life (university attended, subject studied, mode of study and so on). In the third stage, an additional two variables were included relating to students' use of digital technologies for everyday life, and specifically for university. These variables were analysed in order to gain a sense of what characteristics had the clearest bearing on a student reporting Wikipedia to be useful. The full list of variables appears in the Appendix.

Thematic analysis was used with the textual data, arising from the open-ended questionnaire items and group interview data related to perceived usefulness of Wikipedia. This involved initial readings of all interview data and responses to the open-ended survey items relating to Wikipedia to gain an overall sense of the data. These data were then read again and 'open-coded' to produce an initial code list until, in the opinion of the research team, analysis had reached theoretical saturation. From this basis the data were then coded in terms of categories identified with the initial code list directly related to the aims of the study.

4. Results

4.1. To what extent is Wikipedia being used - and valued as useful - by undergraduate students?

87.5 per cent of respondents reported making use of Wikipedia as part of their university studies (see Table 2). This represents a large proportion of students – although less than reported making use of official university 'learning management systems' and library resources, as well as other social media applications such as YouTube and Facebook.

Of those students who had used Wikipedia as part of their university studies, nearly two-thirds reported it as being 'useful' or 'very useful'. Tellingly, Wikipedia was one of the applications least likely to be reported as 'very useful' (24.0 per cent). This placed Wikipedia above only three other digital applications – Twitter (reported as 'very useful' by only 3.5 per cent of students who had used it as part of their

university studies), educational games and simulations (18.6 per cent) and 'other university websites' (11.9 per cent).

Table 2. *Students' use and perceived usefulness of digital technology resources in relation to their university studies.*

	Used as part of university studies	Reported as 'Useful' or 'Very Useful'	Reported as 'Very Useful'
Learning Management System	99.8	94.8	57.8
Use internet search engines to find information	99.4	96.9	68.3
Library website	98.2	83.4	40.2
Use library online resources to find information	97.2	93.7	66.2
Watch or listen to audio recordings or videos about your subject/ discipline (e.g. YouTube, Vimeo)	92.8	84.4	40.6
Search for papers/journals on non-university provided scholarly websites	91.8	81.5	45.7
Use social networking sites for working with other students on your courses (e.g. Facebook)	89.0	74.8	36.5
Finding information through Wikipedia	**87.5**	**65.3**	**24.0**
Other university websites	84.0	52.3	11.9
E-books or e-textbooks	83.9	76.8	37.6
Use web-based document for working with other students on your courses (e.g. Google Docs, Wikispaces	73.6	71.5	33.9
Web-based citation/bibliography tools	72.3	63.3	31.3
Freely available courses and educational content from outside of my university (e.g. i-Tunes U, Khan Academy, OERs)	65.6	64.6	29.8
Simulations or educational games	57.2	52.1	18.6
Software specific to my study area	56.9	64.3	28.4
Twitter	48.1	14.5	3.5

Note. Data are percentage of sample responding to each survey item.

4.2. How does Wikipedia use and usefulness vary between different groups of students?

Clearly, then, while a prevalent element of many students' digital academic practice Wikipedia is not universally used and/or valued. The varied engagement with Wikipedia across our sample of undergraduate students is shown in Table 3. As can be seen, use of Wikipedia was not only found to differ according to gender, discipline and students' domiciled status, but also increased throughout the years of study: from 83.8 per cent of students in their first year of study; to 87.2 per cent of second year; 88.7 per cent of third years; and 94.2 per cent of students studying in their fourth/final year.

Differences were also apparent in terms of the perceived usefulness of Wikipedia. Looking for information on Wikipedia was perceived to be more useful by males (76.7 per cent) as opposed to females (58.7 per cent). Again, these differences were accompanied by subject-related differences, with 78.2 per cent of respondents studying Engineering, Computer Science & Maths subjects reporting Wikipedia as useful, as compared to 34.4 of students studying Education subjects. Furthermore, Wikipedia use was also perceived as more useful by younger (71.1 per cent) rather than mature-aged (63.7 per cent) students, and students not working in paid employment while studying (72.0 per cent) as compared to students working in paid employment (61.5 per cent).

Table 3. *Students' use of Wikipedia by individual characteristics, and the perceived usefulness of this use (where appropriate).*

	Make use of Wikipedia as part of their academic studies	If using Wikipedia, then find it to be 'Useful' or 'Very Useful' for academic studies	If using Wikipedia, then find it to be 'Very Useful' for academic studies
Gender			
Female	80.8	58.7	19.1
Male	94.6	76.7	30.7
Year of study			
First	81.0	60.1	18.3
Second	84.3	67.0	23.8
Third	87.4	67.7	24.7
Fourth	91.6	70.0	33.7
Subject area			
Engineering, Computer Science & Maths	96.8	78.2	37.4
Law	91.9	53.2	22.1
Creative arts and design	91.5	68.2	25.6
Sciences (physical and biological)	90.6	72.7	28.7
Humanities, languages and library studies	86.8	61.7	13.6
Medicine (and allied subjects)	84.8	67.7	27.4
Business	83.9	64.6	21.9
Social sciences, economics and politics	80.6	67.1	21.3
Education	72.3	34.4	8.1
Mode of study			
Full-time study	86.5	65.1	23.8
Part-time study	73.5	67.1	16.0
Age group			
Non mature aged student	86.0	71.1	23.4
Mature aged student	83.4	63.7	22.5
Academic performance			
High distinction	88.7	67.1	23.8
Distinction	85.5	65.0	26.2
Credit	84.3	62.4	22.4
Pass or lower	86.2	72.5	24.0
Domicile			
Domestic/home student	84.3	63.2	22.5
International student	94.3	78.9	28.3
Employment status			
Working in paid employment while studying	86.8	61.5	21.6
Not working in paid employment while studying	88.7	72.0	28.3

Note. Data are percentage of sample responding to each survey item.

4.3. Which groups of students are most likely to find Wikipedia useful?

At the outset, using 1,372 complete records, a total of 722 students reported finding Wikipedia useful in their studies, compared to 650 who did not. This represents a base figure of 52.6 percent, with a further 47.4 percent that could be 'explained' by the model.

Table 4. *Predictions of whether students report finding Wikipedia useful by personal characteristics*

	Base level	Step one:	Step two:	Step three:

		only birth variables included	current background variables included	IT variables included
Observed Wikipedia not useful	47.4%	62.2%	61.8%	61.5%
Observed Wikipedia useful	52.6%	62.5%	70.1%	76.9%
Overall accuracy of prediction	50.0%	62.3%	66.2%	69.6%

The first stage of our logistic regression analysis used only those background variables that we could have known about each individual since birth (see Tables Four and Five). With these variables we can predict their likelihood of finding Wikipedia useful with 62.6 percent accuracy (or put another way we can improve on the accuracy of a guess due only to chance by 21 percent, compared to the base figure). In producing this model, factors such as first language, disability and ethnicity of each individual were found to be irrelevant if other factors were taken into account at the same time. The only background variables of substantive relevance were *gender* (males were 2.6 times as likely to report finding Wikipedia useful); *English spoken at home* (respondents not speaking English at home were 1.96 times as likely to report finding Wikipedia useful); and *age* (finding Wikipedia useful increased by around 1.02 for each year of age).

Table 5. *Coefficients of substantive predictor variables at each stage of the model*

	Base level	Step one: only birth variables included	Step two: current background variables included	Step three: IT variables included
Males (versus females)	2.6	2.4	2.4	
English spoken at home (vs not)	2.0	2.1	2.1	
Age	1.02	0.99	0.99	
University A (vs B)	-	1.7	1.8	
Year 1 (vs 4)	-	0.4	0.4	
Year 2 (vs 4)	-	0.7	0.7	
Year 3 (vs 4)	-	0.7	0.7	
Medicine	-	3.6	3.5	
Science	-	4.1	4.1	
Engineering	-	4.8	4.7	
Business	-	2.7	2.6	
Social sciences	-	3.1	3.0	
Law	-	2.5	2.5	
Humanities	-	3.4	3.4	
Creative arts	-	4.6	4.4	
Traditional age (vs not)	-	1.9	1.9	
Working (vs not)	-	1.6	1.6	
Hours worked 6-10 (vs 5 or less)	-	1.7	1.6	
Hours worked 11-20 (vs 5 or less)	-	1.0	0.9	
Hours worked>20 (vs 5 or less	-	1.0	0.9	

The second stage of our logistic regression analysis used background variables known about each individual now (see Table Four). With these variables we can improve our prediction about the use of computers for learning to 66.2 percent accuracy (or put another way we can improve on a guess due only to chance by a further 8 percent). In producing this model, academic performance, domestic/foreign status, studying on a fulltime/part-time basis, living on/off campus were found to be irrelevant once other factors had been taken into account. The background variables of substantive relevance for this second stage of the model were:

- *University attended* – respondents from University A were 1.75 more likely to report finding Wikipedia useful than those from University B;
- *Year of study* – fourth/final year students were more likely to report finding Wikipedia useful (1.0) when compared to students in Year one (0.39); Year Two (0.73); and Year Three (0.67).
- *Subject of study* – students studying any subject than Education were more likely to report funding Wikipedia useful – i.e. Medicine (3.61); Sciences (4.09); Engineering (4.75); Business (2.69); Social Sciences (3.10); Law (2.46); Humanities (3.43); Creative Arts (4.56)
- *Traditional age students* – were 1.93 more likely to find Wikipedia useful than mature aged students
- *Working in paid employment* – those also working in part-time paid employment were 1.58 more likely to report finding Wikipedia useful than those not working
- *Amount of paid employment* – 6 to 10 hours a week (1.70); 11 to 20 hours (1.03) and more than 20 hours (1.04)

The third stage of our logistic regression analysis used background variables known about each individual's current use of digital technologies (see Table Four). With these variables we can improve our prediction about the use of computers for learning to 69.6 percent accuracy (or put another way we can improve on a guess due only to chance by a further 8 percent). In producing this model, students' use of digital technologies specifically for academic purposes were found to be irrelevant once other factors had been taken into account. And nearly all respondents reported using IT in everyday life more generally and beyond their academic work 93 percent). However, of those that did not use IT, almost all (99 percent) did not use Wikipedia for academic purposes.

Of course, the predictive scope of this regression model was limited to the survey data, and clearly does not include other variables that have a bearing on perceived usefulness of Wikipedia. Yet this model is interesting in indicating which factors included in our survey are of most relevance. Here we find Wikipedia usefulness to be influenced most by whether or not a student is male, in advanced years of study (e.g. fourth/ final year), and not speaking English at home. In addition, factors such as university attended, subject area and nature of IT use are linked but to a lesser extent.

4.4. What do students tell us about the role that Wikipedia plays in their academic lives?

We can now turn to the open-ended responses that students were invited to provide through the survey and subsequent follow-up interviews with regards to why various digital technologies were useful in their academic studies. Responses relating to Wikipedia revealed the following different aspects of use and utility:

First was the notion of Wikipedia offering an entry-level, **initial introduction to a topic** or area of study – i.e. "*Used as a preliminary research tool/medium to understand concepts, theories, terms and definitions*" (survey respondent#1853). As such, students benefitted from the *"often simplified"* (#1853) nature of Wikipedia entries in comparison to their university materials. As one student reasoned:

> *"I think usually uni readings are overcomplicated and do not explain things very straightforwardly. Wikipedia explain concepts clearly so that I am more able to understand the uni readings"* (#217)

In addition to this orientation role, Wikipedia was also valued as **a source of clarification and interpretation** while engaging with university material - *"if i didn't know, i could go check, nothing ambiguous in text"* (#304). As another student put it, Wikipedia was used in instances where *"I don't quite understand. ... if i don't understand a particular word or theory it makes it really helpful in learn"* (#1687). This notion of Wikipedia as a check for specialised vocabulary and terminology was a recurring theme in our interviews:

> *"If I don't understand a word that's in a [Law] case or something that the lecturer used, I will just type in Google and it'll give me a definition on Wikipedia"* [Female interviewee, Uni B, Non-STEM subject]

> *"For example, in sociology, some of the theories that you get, they're just worded so weirdly and you just don't understand what it means. So you just go to Wikipedia just to get a simple definition of what it is and an example of it. Then I can relate to what the author actually said"* (M, Uni A, Non-STEM)

Another aspect of this supplementary role was students' use of Wikipedia as **a bibliographic source** – i.e. providing students with a ready list of relevant *"further reading"* (#548) and *"lots of sources to check out"* (#496). These students were careful to distinguish between making use of references from Wikipedia entries and directly using Wikipedia material - *"I don't <u>cite</u> Wikipedia ... but I use the citations that they have there"* (F, Uni A, non-STEM). Another student described this as *"going back up"* to the primary sources – *"if I'm writing an essay, I'm not quoting Wikipedia, I'm quoting someone else"* (M, Uni A, Non-STEM).

Only a few students referred to **relying on Wikipedia in a more extensive and less rigorous manner**. For example, Wikipedia was seen as an ideal tool for *"assessment cramming"* (#1704) when time was short, therefore allowing time-constrained students to *"quickly find information ... without need to go to the library"* (#1150). Students' justifications for extensive reliance on Wikipedia varied – as one student reasoned, *"our lecturer himself looks on Wikipedia for information"* (M, Uni B, STEM). While recognizing that *"we are not allowed to use Wikipedia ... because it's not really academic"* (F, Uni A, non-STEM), students made the distinction between higher level assessments where *"you need to know the details especially to get the better grades"* (F, Uni A, non-STEM and lower-level *"simple tests, where you just have to remember content"* (M, Uni A, non-STEM). In these latter cases, Wikipedia was reckoned by a few students as an adequate primary source of information:

> *"I just had a history exam I did before. We just needed to learn sort of key terms throughout the lecture. I actually talked to another lad in the class and he said, yep, I use Wikipedia too, to get all the content that I needed. He didn't rock up* [slang: to show up] *to any lectures throughout the year. Just to*

the class test at the end. ... so yeah, for all the key terms, Wikipedia" (M, A, non-STEM).

5. Discussion & conclusions

While just one element of undergraduate technology use, this paper has been able to explore the role that Wikipedia has now come to play as a (relatively) 'mature' technology in higher education. Our survey data certainly confirm Wikipedia to be an embedded feature of most students' digitally-supported scholarship. That said, Wikipedia was not reported as the dominant source of 'unofficial' information that one might have expected. Instead, our survey found watching online videos (e.g. via YouTube) and interacting with students on Facebook as more prevalent digital practices to support students' academic work. University students are clearly accessing information and study support from a variety of online sources – including other social media - with Wikipedia by no means a universally dominant or favoured source.

Indeed, our data certainly warn against specific concern over Wikipedia assuming a disproportionally privileged role in students' academic practices. While nearly 90 per cent of students reported using Wikipedia, it was seen generally to be of limited usefulness. Respondents were far more likely to see library resources, e-books, learning management systems, lecture recordings and scholarly search sites as 'very useful' aspects of their university studies than Wikipedia. Our in-depth data found only a few students prepared to rely on Wikipedia as a primary source, and then only in specific circumstances and for specific tasks. For the most part, Wikipedia was described as fulfilling a supplementary and/or introductory role, providing students with initial orientation and occasional clarification on topics and concepts which they would subsequently research more thoroughly elsewhere.

Perhaps the most notable aspect of our study was the differences between which students reported Wikipedia to be a particularly 'useful' aspect of their academic studies. While limited to the variables that were included in the survey, our logistic regression highlighted a number of patterns which merit further investigation. For instance, the heightened role that Wikipedia plays for students not speaking English at home clearly merits more specific empirical attention, as well as highlighting a sector of the student population whose Wikipedia use might benefit from targeted support from their universities (see also Sin 2015). Similarly notable – but less obviously explained – was our finding of gender differences in terms of students who were reporting Wikipedia to be a useful part of their studies. In an era when the gendered nature of digital technology is beginning to be seen as less immediately prevalent than before, this finding from our present study clearly merits further investigation and focused research.

Also of note was the correlation between increased perceptions of Wikipedia's usefulness and students' year of study. This finding raises a few different possible explanations. For example, it could be that students learn to make better use of Wikipedia as they progress through their degrees (i.e. they become more adept users through experience), *or* that they become more willing to cut corners in the quality of their university work, *or* that as the difficulty of their university work increases they

become more in need of elementary support. Either way, the fact that Wikipedia use and usefulness increased with the level of study merits further research and consideration (see also Kim *et al*. 2014).

All told, these findings and trends confirm the widespread but largely mundane role that Wikipedia now plays in contemporary higher education. As such, these findings suggest that universities and university teachers should continue to consider ways of better integrating Wikipedia into their accepted modes of teaching and learning provision. Our findings would seem to support conclusions from earlier studies that there is little point recommending *against* student use of Wikipedia, or attempting to prohibit it altogether. Yet there is clearly sense in more efforts being directed towards supporting students in becoming critical and proficient users of Wikipedia as part of their information gathering and sense-making practices.

As such, Wikipedia might be better seen by university educators as a site for exploring critical understandings of the changing nature of textual authority and knowledge construction (Leitch 2015). Moreover, the issue of moving beyond the passive consumption of Wikipedia content perhaps needs to be foregrounded in the student consciousness. Looking back to the claims of Willinsky noted at the beginning of this paper, it was telling that there was no evidence in our investigations of students contributing to Wikipedia as editors or producers. As such, there are clearly many ways in which universities need to engage more directly in supporting and enhancing the role that Wikipedia is now playing in students' scholarship. For example, efforts are beginning to be made to build Wikipedia authorship and editing as part of class activities and even as part of assessed coursework (see Jones 2015). Clearly, universities now need to be following the lead of their students and actively engaging with Wikipedia as an accepted course of information and knowledge.

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Appendix – Variables used as predictors in logistic regression model

Variable	Base/comparator category used
Subject of study	education
Hours worked part-time	more than 20
Academic qualifications	higher distinction
Year of study	4th
Use of IT at university	yes
First language	not English
Language spoken at home	not English
Ethnicity	Aboriginal
Disability	none
University	university B
Mature students	not
IT use in general	yes
Working	yes
Domestic resident	no
Living arrangements	on campus
Full-time student	yes
Sex	male