Research in Learning Technology
Vol. 26, 2018

ASSOCIATION FOR LEARNING TECHNOLOGY ALT

ORIGINAL RESEARCH ARTICLE

Communication, collaboration and identity: factor analysis of academics' perceptions of online networking

Katy Jordan* and Martin Weller

Institute of Educational Technology, The Open University, Milton Keynes, UK

(Received 12 October 2017; final version received 1 March 2018)

Since the advent of online social networking sites, much has been written about their potential for transforming academia, as communication and collaboration underpin many scholarly activities. However, the extent to which these benefits are being realised in practice is unclear. As the uptake of tools by academics continues to grow, there is a question as to whether differences exist in their use and if any patterns or underlying factors are at play. This article presents the results of an online survey addressing this gap. A disciplinary divide was evident in terms of preferred academic social networking platforms, while perceptions about how academics use online networking for different purposes are linked to job position. Exploratory factor analysis identified four components representing different strategies used by academics in their approaches to online networking, including maintaining a personal learning network, promoting the professional self, seeking and promoting publications, and advancing careers.

Keywords: social media; academic networking; social networking sites; digital scholarship

Introduction

Online social networking sites (SNS) have experienced a proliferation and rapid expansion in users in the past decade (boyd and Ellison 2007; Rainie and Wellman 2012). The term 'SNS' is used to define social media platforms which allow users to create profiles, make connections to others and navigate through the results network of connections (Ellison and boyd 2013). The effects of SNS upon ways of working and interacting with others have been felt in all aspects of society, including academia. In addition to appropriation of generic services (such as Facebook or LinkedIn), a number of academic SNS have entered the market since 2007 (Nentwich and König 2012). At present, Academia.edu and ResearchGate are the largest and best-known sites specifically designed for academics (van Noorden 2014). However, there is variation in uptake of the sites and how they are being used in practice, and generic tools (such as Twitter or Facebook) are more widely used and are also being appropriated for professional purposes (ibid.).

Developing an understanding of the ways in which SNS may mediate or transform the professional activities of academics sits within a broader research agenda known as

*Corresponding author. Email: katy.jordan@open.ac.uk

Citation: Research in Learning Technology 2018, **26**: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

Digital Scholarship (Weller 2011). Digital Scholarship is concerned with how the Internet and digital technologies are transforming scholarly practice, encompassing a range of social and technological factors. In this sense, SNS represent one of the platforms through which digital scholarly practices may be enacted. Veletsianos and Kimmons (2012) further characterise the affordances of online social networks in particular for academics as networked participatory scholarship. Networked participatory scholarship is particularly focused on the relationship between social, networked tools and academic practice, through examining the ways that 'scholars' participation in online social networks [is] to share, reflect upon, critique, improve, validate, and otherwise develop their scholarship' (Veletsianos and Kimmons 2012, p. 766). The technical affordances of academic SNS focus on enhancing collaboration, scholarly communication and digital identity management for academics (Bullinger *et al*. 2010). However, the academic context which such services seek to embed themselves within is complex, subject to contrasting disciplinary cultures (Becher 1989), pressures at different stages of individuals' career and identity trajectory (McAlpine and Akerlind 2010), and may be influenced by the individuals' level of experience with using social media (Donelan 2016).

The level of use of online networking tools by academics has been addressed by a growing body of empirical studies. The phrase 'level of use' can have two meanings in this context: firstly, the particular tools or platforms that academics use and, secondly, the ways and purposes for which they are used. Studies typically employ online survey-based research methods and can be divided into two categories: large-scale international studies (Lupton 2014; Nicholas and Rowlands 2011; van Noorden 2014) and those that focus on individual institutions or localised higher education sectors (Al-Aufi and Fulton 2014, 2015; Cruz and Jamias 2013; Madhusudhan 2012; Manca and Ranieri 2016; Ruleman 2012; Singh and Singh Gill 2015). The studies address the extent of uptake in terms of both the purposes for which academics use social media and the specific platforms they use. Comparable data about particular platforms are presented in Table 1.

Table 1 illustrates a number of notable characteristics. Firstly, there is a great deal of variation between different studies. Secondly, social networking tools are those most consistently included in surveys. Thirdly, generic tools (in comparison to those aimed specifically at academics) enjoy the highest levels of use (also noted by Nicholas and Rowlands 2011). A temporal factor may also be present, although the studies represent only a 4-year period and there is variation in the exact wording of questions which makes it difficult to assess. Peer pressure has been identified as a factor experienced by academics when adopting social media for their professional practice (Kieslinger 2015), which is likely to be exacerbated over time.

In addition to asking about particular platforms, the studies also addressed academics' use of social media in terms of types of functions that tools play, although the use of a variety of different typologies prevents direct comparability between studies. This is also reflected in the diversity of results reported, even when focusing only on the most frequently reported aspects. For example, Nicholas and Rowlands (2011) report the three most popular types of social media used by researchers as 'collaborative authoring' (62.7%), 'conferencing' (48.3%) and 'scheduling and meeting tools' (41.0%). 'Social networking' was identified by 27.0% of the sample (Nicholas and Rowlands 2011). In contrast, 'collaborative authoring' was only raised by 21% of the Delhi sample and 'social networking' the second most prevalent use (69%) after 'communication tools' (80%) (Madhusudhan 2012). 'Social connections' were identified as the most important use by academics at Sultan Qaboos University and University

Citation: Research in Learning Technology 2018, 26: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

Table 1. Percentage of academics who reported using different social media platforms.

Typology	Platform	Madhu-sudhan (2012)	Ruleman (2012)	Nature Publishing Group (2014)	Lupton (2014)	Manca and Ranieri (2016)
	Question asked	Use tools	Using it more lately or use it all the time	Aware of site and visit regularly	Use site as part of their professional academic work	Daily use or weekly use
Blogging	A blog	57.5			32	
Microblogging	Twitter	17.5	5.0	14.4	90	7.4, 3.9
Social networking	Academia.edu			8.1	49	
	Facebook	77.5	49.6	40.5	42	32.4, 10.0
	Google+			21.7	21	
	LinkedIn	10.6	15.5	40.8	60	10.3, 11.2
	MySpace	23.75	1.6			
	ResearchGate			46.2	33	
Social bookmarking	Delicious	11.25	4.9			
Photographs	Flickr	40	5.9		5	
Video	YouTube	60			25	30.5, 8.6
Presentation sharing	SlideShare	20			13	2.6, 3.1
Impact	Google Scholar			62.6	1	

Note: The pairs of values given for Manca and Ranieri show values for 'personal, "professional" use'.

College Dublin (Al-Aufi and Fulton 2014, 2015). Collaborative authoring and social networking-related uses do not rank as highly as uses relating to receiving and managing information (Carpenter, Wetheridge, and Smith 2010, p. 37).

When considering social media use by academics in terms of different uses or specific tools, there is a lack of consensus and wide variation in the reported extent of uptake. Differences in terminology, sampling strategies and the flux of new social media tools may contribute to the challenge of accurately gauging uptake. This article will report the results of an online survey, which sought to gauge the level of use of academic SNS in terms of both platforms used and the ways in which academics use online networking in relation to their professional lives. The results help to clarify the mixed picture created by previous similar studies. Furthermore, the survey design allowed to further levels of analysis, making a novel contribution to the field. Factor analysis was conducted in order to examine whether underlying patterns exist in the ways in which academics use online networking, and nonparametric statistical tests were used to examine whether differences exist according to discipline or job position.

Methods

The study used an online survey to explore levels of use of different SNS by academics and the ways in which online networking is used in relation to academics' professional lives. The survey was carried out via the Bristol Online Surveys platform from November 2014 to February 2015. Prior to its launch, approval was sought and obtained from the University Human Research Ethics Committee. Ethical considerations associated with the survey related mainly to giving participants sufficient information to be able to give informed consent before participating in the survey and protecting their identities in the collected data and its analysis. The survey was publicised via Academia.edu, LinkedIn, ResearchGate and Twitter, with the information circulating to a greater extent via Twitter. The survey was completed by 528 respondents. The survey responses included academics from across the globe, spanning 385 higher education institutions. Roughly half of the participants (55%) were based in the UK, followed by 20% in North America, 11% in other European Union (EU) countries, 9% in Australasia, 1% in Africa, 1% in Asia and 1% in Central and South America.

The survey comprised three sections: demographic questions, frequency of use of a range of online social networking platforms and a Likert scale inventory of statements about ways of using the sites. The demographic section included categories for subject area and job position, which would form the basis of statistical tests during analysis. Subjects were based on the Higher Education Statistics Agency (HESA 2013) classification scheme and presented as a radio button list. For analysis, subjects were subsequently categorised into five disciplinary areas: Arts and Humanities (19% of respondents), Formal Sciences (5%), Natural Sciences (14%), Professions (33%) and Social Sciences (28%). The categories presented for job position included graduate student (26% of respondents), researcher (17.4%), lecturer (31%), professor (18%) and other (7%).

In the second section, a list of SNS was presented and participants were asked to indicate their use on the following scale: 'most days', 'most weeks', 'monthly', 'rarely (less than once a month)', 'I created a profile at the site but have not used it since' or not applicable ('N/A'). The opportunity to add comments in response to any of the sites was presented. The sites listed included Academia.edu, a blog, Diigo, Facebook, Google+, LinkedIn, Mendeley, ResearchGate, SlideShare, Twitter and Zotero. The first and second sections were analysed through descriptive statistics, and provided demographic categorical variables to include in the analysis of the third section of the survey.

The inventory of Likert scale items and the existing studies which informed them are shown in Table 2. The Likert scale items are arranged around six themes which emerged from the existing literature: characterisations of the role of profiles, collaboration, network structure, dissemination, receiving information and career development.

Although the themes were derived from the existing literature and largely based on the potential for use, they have not been widely tested empirically or examined in terms of underlying factors. To this end, the inventory of Likert scale items in the third section was analysed using three methods: descriptive statistics to understand the items' relative importance; factor analysis to examine whether there are latent variables linking the responses between individual statements; and nonparametric tests to look for differences in responses according to career (job position or discipline).

Factor analysis was undertaken on the 24 Likert scale items shown in Table 2 to examine whether any latent underlying variables account for patterns in responses

Citation: Research in Learning Technology 2018, 26: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

Table 2. Inventory of Likert scale items included in the survey.

Item	Rationale and basis
I see my profile as an online business card Developing my online identity is important to me as an academic I present my identity in different ways on different sites My online academic and personal identities are separated I use my profile as a research journal I feel I should probably do more to promote my research using online networks I don't think having a professional profile on an online network is very important for a researcher I use social networking sites to support my teaching activities	Characterisations of the role of profiles on academic SNS (Bukvova 2012; Veletsianos and Kimmons 2013).
Social networking sites are a useful way to support working in collaboration with other researchers I use social networking sites to discover peers working in my field of research I actively interact with other academics via social networking sites I use social networking sites to discover individuals outside my field of research	Collaborative aspects of academic social networking – draws upon Jeng *et al*. 2012; Oh and Jeng 2011 – but focus upon individuals rather than groups.
I follow people as a way of staying in touch with people I used to work with If someone follows me, I follow them back I follow people who I would like to work with in the future I only follow people who I know personally	Exploring trends in network structure (Jordan 2014a).
I use social networking sites to track metrics relating to interest in my work Social networking sites are a good way of promoting my own academic publications	Dissemination – draws upon Nature survey (Nature Publishing Group 2014).
Social networking sites are a good way of finding out about new publications of interest Social networking sites allow me to draw upon a wider community of expertise when I need help Being able to ask questions of the online community is important Viewing other researchers' professional profiles on online networks is a useful way of determining what research I should be reading	Gaining information – draws upon Nature survey (Nature Publishing Group 2014) and question use (Almousa 2011; Menendez, de Angeli, and Menestrina 2012).
Social networking sites are useful to discover job opportunities Having a profile will enhance my future career prospects	Career-related issues – draws upon Nature survey (Nature Publishing Group 2014) and differences according to job position (Almousa 2011; Menendez, de Angeli, and Menestrina 2012)

to the items. A principal component analysis (PCA) was conducted on the 24 Likert scale items with orthogonal rotation (varimax). The Kaiser-Meyer-Olkin (KMO) measure verified the sampling adequacy for the analysis, KMO = 0.89, and all KMO values for individual items were >0.56 (the acceptable limit being 0.5; Field 2009a). Bartlett's test of sphericity $\chi 2\ (276) = 3466.859$, $p < 0.001$, indicated that correlations between items were sufficiently large for PCA.

An initial analysis was run to obtain eigenvalues for each component in the data. Six components had eigenvalues over Kaiser's criterion of 1 and in combination explained 55.04% of the variance. The scree plot was ambiguous and showed inflexions that would justify retaining components 4 and 6. Four components were retained for the final analysis as components 5 and 6 gave poor values of Cronbach's alpha (<0.25) in the initial analysis.

Differences between subsets of demographic groups – including discipline and job position – were examined using nonparametric Kruskal–Wallis tests (Field 2009b; Jamieson 2004). Pairwise Mann–Whitney U tests were used as post hoc tests to identify which categories the statistically significant differences could be attributed to (Field 2009b). When administering post hoc tests, the Bonferroni correction was used to adjust the value of α to mitigate the increased risk of Type I errors when carrying out multiple tests (Field 2009b). For tests concerned with job position (four categories), the adjusted α is 0.0083; for tests using discipline (five categories), the adjusted α is 0.005.

Results and analysis

The introductory section of the survey also asked respondents about their levels of use of a variety of different SNS. The responses to this section are summarised in Table 3.

Consistent with their membership statistics, Academia.edu and ResearchGate emerged as the most popular academic SNS, although their levels of use are dwarfed by the best-known generic tools (this also confirms the findings of van Noorden 2014). However, a disciplinary divide was apparent. Arts and Humanities and Social Sciences favour Academia.edu, and Natural Sciences prefers ResearchGate (Figure 1). Although this was not explored in the original analysis of the Nature data set (van Noorden 2014), the data set was published online (Nature Publishing Group 2014) and independent analysis found similar disciplinary platform preferences (Jordan 2014b).

The question of whether any underlying latent variables explain patterns in responses to the 24 individual Likert scale items was addressed via exploratory factor analysis. The items that load on the same components suggest that:

- Component 1 represents collaboration and personal learning network.
- Component 2 represents dissemination and promoting the professional self.
- Component 3 represents keeping updated about research.
- Component 4 represents a strategic use of online networks for career progression.

Components 1, 2 and 3 all had high reliabilities (Cronbach's alpha > 0.77). Component 4 had a relatively low reliability, with Cronbach's alpha = 0.56.

To examine whether any significant differences exist in relation to how academics perceive online networks according to job position or discipline, nonparametric tests

Citation: Research in Learning Technology 2018, 26: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

Table 3. Summary of survey responses about the level of use and awareness of a range of SNS.

Site	Most days	Most weeks	Monthly	Rarely (less than once a month)	I created a profile at the site but have not used it since	N/A
Academia.edu (74.4)	4.2	17.4	15	20.8	15	25.6
A blog (75.6)	11.7	19.9	17.2	17.2	7.4	24.4
Diigo (16.9)	0.9	1.3	1.3	4.5	3.2	83.1
Facebook (88.4)	69.1	8.1	3.6	5.1	1.5	11.6
Google+ (77.5)	6.6	10.4	14	22	21	22.5
Google Scholar (85.2)	19.3	34.3	14.4	12.5	2.5	14.8
LinkedIn (80.7)	10	26.7	19.7	15	8.5	19.3
Mendeley (40.2)	5.9	5.3	4	8.3	13.6	59.8
ResearchGate (50.8)	3	11.6	12.1	12.9	8.9	49.2
SlideShare (39.2)	0.8	5.1	7.6	13.8	8.3	60.8
Twitter (98.5)	86.7	8.7	0.6	1.5	0.4	1.5
Zotero (33.1)	3.8	3.6	4.7	6.3	11.9	66.9

Note: The question asked is: 'How often do you use the following sites?' Figures in brackets show the total percentage of respondents who have ever used each site.

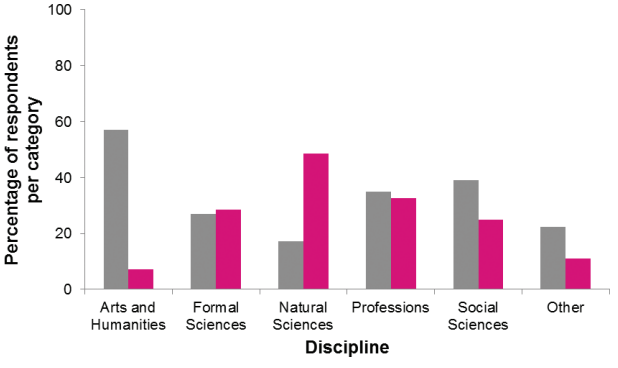

Figure 1. Percentage of respondents per discipline who used the academic SNS Academia.edu (grey bars) and ResearchGate (pink bars).
Note: This includes all who selected 'most days', 'most weeks', or 'monthly'.

considered differences in terms of these categorical variables. Five of the 24 Likert scale items showed significant differences according to discipline. Although some significant differences were found, a consistent picture did not emerge from the findings, that is, the items showing significant differences were not clustered around a particular theme or showed consistent divides according to particular disciplines.Social Sciences and Professions showed lower agreement with the item 'I use social networking sites to discover peers working in my field of research' than other disciplines, and higher agreement with the item 'social networking sites are a useful way to support working in collaboration with other researchers'. Natural Sciences stood out for two items,

showing higher levels of agreement with the item 'social networking sites are useful to discover job opportunities' and lower agreement with 'I use social networking sites to support my teaching activities' compared to other disciplines. The item 'I feel I should probably do more to promote my research using online networks' showed a median of 'agree' for all disciplines except Formal Sciences, which showed 'neither agree nor disagree'. Note that the sample size for Formal Sciences is relatively small and therefore may be more influenced by outliers. Four of the Likert scale items showed significant differences according to job position. Different themes appear to be of significance at different career stages. Three items showed a median of 'agree' for graduate students, researchers and lecturers, but are considered less important ('neither agree nor disagree') for professors, including 'I follow people who I would like to work with in the future', 'having a profile will enhance my future career prospects' and 'social networking sites are useful to discover job opportunities'. In contrast, the item 'I use social networking sites to support my teaching activities' elicited higher levels of agreement with professors and lecturers compared to students and researchers.

Discussion and conclusions

The results will be discussed here in three sections, according to the aims of the study: (1) different uses of online social networking tools by academics, (2) underlying patterns in the ways in which academics use online networking and (3) whether differences exist according to the discipline or job position.

Different uses of online social networking tools by academics

In terms of the prevalence of particular platforms, the data confirm certain trends in relation to previous studies. A mixed picture has emerged from previous studies about the levels of use of different social media platforms by academics (Table 1). The findings of the present study are shown in Table 3; consistent with the previous studies, generic tools consistently enjoy higher levels of use by academics than those specifically aimed at an academic audience. However, a consistent picture overall has failed to emerge. The data do not confirm or rule out a temporal aspect to uptake of particular sites, for example.

Considering the ways in which academics use online networking tools, the Likert scale items showed high levels of agreement overall, which may reflect the opt-in nature of the survey and bias towards higher level social media users. It is therefore helpful to consider the 24 Likert scale items in terms of relative agreement levels. The most highly ranked items centre upon themes of discovery, peer support and self-promotion. For example:

- Discovery: 'Social networking sites are a good way of finding out about new publications of interest' (ranked first), 'I use social networking sites to discover peers working in my field of research' (second) and 'I use social networking sites to discover individuals outside my field of research' (ninth).
- Peer support: 'Social networking sites allow me to draw upon a wider community of expertise when I need help' (ranked fourth), 'being able to ask questions of the online community is important' (seventh) and 'social networking sites are a useful way to support working in collaboration with other researchers' (tenth).

Citation: Research in Learning Technology 2018, 26: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

- Self-promotion: 'Social networking sites are a good way of promoting my own academic publications' (ranked sixth) and 'I see my profile as an online business card' (eighth).

Two items which show notably different distributions of responses to the high levels of agreement overall relate to identities and teaching. The item 'my online academic and personal identities are separated' demonstrated a bimodal distribution, illustrating that even within a sample of more active users, whether personal and professional identities are kept separate online is a divisive issue and warrants further research. The responses to the item 'I use social networking sites to support my teaching activities' were divided (54% agreeing with the statement). Whilst this may be due in part to whether or not participants have teaching duties (see section headed 'Differences according to the discipline or job position'), the use of social media in teaching by academics has proved controversial in other studies. Manca and Ranieri (2016) reported resistance to the role of social media in teaching, whereas Gruzd *et al*. (2016) surveyed academics about their use of social media specifically in relation to teaching. Six factors were reported: (1) facilitating student engagement, (2) instructor's organisation for teaching, (3) engagement with outside resources, (4) enhancing student attention to content, (5) building communities of practice and (6) resource discovery (Gruzd *et al*. 2016). Further work to test the prevalence of teaching in terms of these factors, rather than the use of social media in teaching in general, and how the factors are mediated by different platforms, would help clarify.

Underlying patterns in the use of online networking

The main novel contribution of this study is the use of exploratory factor analysis to look for indications of any latent variables which may account for patterns in the responses to the 24 Likert scale items. Four factors were extracted. The rotated factor loadings are shown in Table 4, arranged according to the survey design themes introduced in Table 2.

Although most of the Likert scale items do not map exclusively onto a single factor, the reliability statistics for each factor are good and there are discernible differences. The first factor can be characterised as a collaborative approach to social media and its use as a personal learning network. This is supported by strong mapping of the items on the themes of collaboration and gaining information onto this factor. Component 2 represents dissemination and promoting the professional self. It primarily comprises the items related to dissemination and the perceived value of having an online profile, but is also strongly linked to collaboration. Component 3 is indicative of using online networks to keep updated about research, including finding new publications and contacts, and an interest in promoting and tracking their own publications. The fourth component represents a more strategic use of online networks for career progression, notably lacking in interactive elements and focused upon networking and careers.

Differences in relation to the themes of role of profiles and network structure provide extra insights into the four factors. For example, the first factor is negatively associated with separation of identities, only following people who they already know, and not thinking that online networking is important. The second factor is more focused upon career progression, with a willingness to follow others with a view to future working relationships and conceptualising profiles as business cards. The third factor, characterized by keeping up-to-date, is linked to making connections with existing

Table 4 Rotated factor loadings, arranged according to the themes outlined in Table 2.

Item	Factor				Theme
	1	2	3	4	
Having a profile will enhance my future career prospects		0.66		0.36	Careers
Social networking sites are useful to discover job opportunities	0.34			0.53	
I actively interact with other academics via social networking sites	0.66	0.27			Collaboration
I use social networking sites to discover individuals outside my field of research	0.54		0.37		
I use social networking sites to discover peers in my field of research	0.34	0.36	0.47		
Social networking sites are a useful way to support working in collaboration with other researchers	0.59	0.3		0.28	
I use social networking sites to track metrics relating to interest in my work		0.32	0.63		Dissemination
Social networking sites are a good way of promoting my own academic publications		0.62	0.33		
Being able to ask questions of the online community is important	0.8				Gain information
Social networking sites allow me to draw upon a wider community of expertise when I need help	0.74	0.21			
Social networking sites are a good way of finding out about new publications of interest	0.43		0.61		
Viewing other researchers' professional profiles on online networks is a useful way of determining what research I should be reading			0.72		
I follow people as a way of staying in touch with people I used to work with			0.45	0.41	Network structure
I follow people who I would like to work with in the future	0.28	0.43	0.22	0.43	
I only follow people who I know personally	-0.27	-0.34		0.26	
If someone follows me, I follow them back				0.42	
Developing my online identity is important to me as an academic	0.39	0.7			Role of profiles
I don't think having a professional profile on an online network is very important	-0.28	-0.68			
I present my identity in different ways on different sites				0.65	
I see my profile as an online business card		0.74	0.27		
I use my profile as a research journal			0.45		
I use social networking sites to support my teaching activities	0.5				
My online academic and personal identities are separated	-0.36			0.41	

Citation: Research in Learning Technology 2018, 26: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

professional contacts as a way of staying in touch. The strategic fourth factor, focused on networking for career progression, is linked to a pronounced separation of personal and professional identities.

Differences according to the discipline or job position

Differences were found both in terms of the choice of academic SNS and the ways in which online networking is used. While Academia.edu and ResearchGate are the most widely used of the specifically academic SNS, their relative prevalence may be understated as there are disciplinary divides (borne out by the present study and Nature data set) in choice of platform. The myriad of tools available (and continued expansion of the social media market) present a challenge in assessing this problem. Further work may be valuable at the level of individual academics rather than general levels of use to examine whether there are any clusters of tools which individual academics use together.

Nonparametric statistical tests examined differences in response to the Likert scale items in relation to two demographic categories: discipline and job position. Items related to career development show consistent differences according to job position, being of greater importance to more junior academics and students. This includes the items 'I follow people who I would like to work with in the future', 'having a profile will enhance my future career prospects', 'social networking sites are useful to discover job opportunities' and 'attracting future employers'. In contrast, the item 'I use social networking sites to supporting my teaching activities' shows higher agreement levels for more senior academics, likely to have greater teaching loads (professors and lecturers). Dissemination appears to be of particular importance to researchers, with higher levels of perceived usefulness in terms of 'sharing authored content' and 'raising the profile of your work in the research community'. These observations illustrate that academics' use of SNS is perceived to be beneficial in different ways at different stages of an academic career.

While five of the items showed differences according to discipline, no trend was identified. These results both support and contrast with the findings of Manca and Ranieri (2016) to an extent, who also report differences in use of social media by academics according to discipline and job position. However, disciplinary differences are reported more extensively (Manca and Ranieri 2016). This difference may be due in part to the tests being carried out on the basis of practices per site (Manca and Ranieri 2016); if further disciplinary differences in site population exist, as has been demonstrated here for Academia.edu and ResearchGate and supported by the Nature data (Nature Publishing Group 2014), any disciplinary differences would be confounded with practices. This again highlights the need for further work into the virtual disciplinary geographies of different social media platforms.

Concluding remarks

While the Likert scale items themselves draw up previous surveys and clarify the relative importance of different uses of social media by academics, the present study extends the field by undertaking two analyses which examine patterns in response to the items.

The factors identified further the understanding of how online technologies and open educational practices, which are often conflated, coalesce around particular strategies. It is important to consider that the factor analysis undertaken here is exploratory

in nature. The reliability scores for the four scales are good and, with some development, a confirmatory factor analysis study based on this one would be valuable in understanding the four scales and potential archetypes of academic social media users.

References

Al-Aufi, A. & Fulton, C. (2014) 'Use of social networking tools for informal scholarly communication in humanities and social sciences disciplines', *Procedia – Social and Behavioral Sciences*, vol. 147, pp. 436–445.

Al-Aufi, A. & Fulton, C. (2015) 'Impact of social networking tools on scholarly communication: a cross-institutional study', *The Electronic Library*, vol. 33, no. 2, pp. 224–241.

Almousa, O. (2011) 'Users' classification and usage-pattern identification in academic social networks', *IEEE Jordan Conference on Applied Electrical Engineering and Computing Technologies*, Amman, Jordan, pp. 1–6.

Becher, T. (1989) *Academic Tribes and Territories: Intellectual Enquiry and the Cultures of Disciplines*, Society for Research in Higher Education, London.

boyd, d. & Ellison, N. B. (2007) 'Social network sites: definition, history and scholarship', *Journal of Computer-Mediated Communication*, vol. 13, no. 1, pp. 210–230.

Bukvova, H. (2012) 'A holistic approach to the analysis of online profiles', *Internet Research*, vol. 22, no. 3, pp. 340–360.

Bullinger, A. C., *et al*., (2010) 'Towards research collaboration – a taxonomy of social research network sites', *Sixteenth Americas Conference on Information Systems*, Lima, Peru, pp. 1–9.

Carpenter, J., Wetheridge, L. & Smith, N. (2010) 'Researchers of tomorrow: annual report 2009–2010', *British Library/JISC*, [online]. Available at: https://www.jisc.ac.uk/reports/researchers-of-tomorrow

Cruz, F. & Jamias, S. B. (2013) 'Scientists' use of social media: the case of researchers at the University of the Philippines Los Baños', *First Monday*, vol. 18, no. 4.

Donelan, H. (2016) 'Social media for professional development and networking opportunities in academia', *Journal of Further and Higher Education*, vol. 40, no. 5, pp. 706–729.

Ellison, N. B. & boyd, d. (2013) 'Sociality through social network sites', in *The Oxford Handbook of Internet Studies*, ed W. H. Dutton, Oxford University Press, Oxford, pp. 151–172.

Field, A. (2009a) 'Exploratory factor analysis', in *Discovering Statistics Using SPSS*, 2nd edn, ed A. Field, Sage, London, pp. 627–685.

Field, A. (2009b) 'Non-parametric tests', in *Discovering Statistics Using SPSS*, 2nd edn, ed A. Field, Sage, London, pp. 539–583.

Gruzd, A., *et al*., (2016) 'Uses and gratifications factors for social media use in teaching: instructors' perspectives', *New Media & Society*, pre-print [online]. Available at: http://dx.doi.org/10.1177/1461444816662933

HESA. (2013) JACS 3.0: Principal Subject Codes, Higher Education Statistics Agency, [online] Available at: https://www.hesa.ac.uk/support/documentation/jacs/jacs3-principal

Jamieson, S. (2004) 'Likert scales: how to (ab)use them', *Medical Education*, vol. 38, no. 12, pp. 1212–1218.

Jeng, W. *et al*., (2012) 'Groups in Mendeley: owners' descriptions and group outcomes', *Association for Information Science and Technology (ASIS&T 2012) Annual Meeting*, Baltimore, MD.

Jordan, K. (2014a) 'Academics and their online networks: exploring the role of academic social networking sites', *First Monday*, vol. 19, no. 11.

Jordan, K. (2014b) 'Academics' awareness, perceptions and uses of social networking sites: analysis of a social networking sites survey dataset', Social Science Research Network, [online] Available at: http://dx.doi.org/10.2139/ssrn.2507318

Kieslinger, B. (2015) 'Academic peer pressure in social media: experiences from the heavy, the targeted and the restricted user', *First Monday*, vol. 20, no. 6.

Citation: Research in Learning Technology 2018, 26: 2013 - http://dx.doi.org/10.25304/rlt.v26.2013

Lupton, D. (2014) 'Feeling Better Connected': Academics' Use of Social Media, University of Canberra, [online] Available at: https://www.canberra.edu.au/about-uc/faculties/arts-design/attachments2/pdf/n-and-mrc/Feeling-Better-Connected-report-final.pdf

Madhusudhan, M. (2012) 'Use of social networking sites by research scholars of the University of Delhi: a study', *The International Information & Library Review*, vol. 44, no. 2, pp. 100–113.

Manca, S. & Ranieri, M. (2016) '"Yes for sharing, no for teaching!": social media in academic practices', *The Internet and Higher Education*, vol. 29, pp. 63–74.

McAlpine, L. & Akerlind, G.S. (2010) *Becoming an Academic: International Perspectives*, Palgrave Macmillan, Basingstoke.

Menendez, M., de Angeli, A. & Menestrina, Z. (2012) 'Exploring the virtual space of academia', *10th International Conference on the Design of Cooperative Systems*, Marseille, France, pp. 49–63.

Nature Publishing Group. (2014) NPG 2014 Social Networks Survey, Figshare, [online] Available at: http://dx.doi.org/10.6084/m9.figshare.1132584

Nentwich, M. & König, R. (2012) *Cyberscience 2.0: Research in the Age of Digital Social Networks*, Campus Verlag, Frankfurt.

Nicholas, D. & Rowlands, I. (2011) 'Social media use in the research workflow', *Information Services and Use*, vol. 31, no. 1–2, pp. 61–83.

Oh, J. S. & Jeng, W. (2011) 'Groups in academic social networking services: an exploration of their potential as a platform for multi-disciplinary collaboration', *2011 IEEE SocialCom*, Boston, MA, pp. 545–548.

Rainie, L. & Wellman, B. (2012) *Networked: The New Social Operating System*, MIT Press, Cambridge, MA.

Ruleman, A. B. (2012) 'Social media at the university: a demographic comparison', *New Library World*, vol. 113, no. 7–8, pp. 316–332.

Singh, K. P. & Singh Gill, M., (2015) 'Role and users' approach to social networking sites (SNSs): a study of universities of North India', *The Electronic Library*, vol. 33, no. 1, pp. 19–34.

van Noorden, R. (2014) 'Online collaboration: scientists and the social network', *Nature*, vol. 12, no. 7513.

Veletsianos, G. & Kimmons, R. (2012) 'Networked participatory scholarship: emergent techno-cultural pressures toward open and digital scholarship in online networks', *Computers & Education*, vol. 58, no. 2, pp. 766–774.

Veletsianos, G. & Kimmons, R. (2013) 'Scholars and faculty members' lived experiences in online social networks', *The Internet and Higher Education*, vol. 16, pp. 43–50.

Weller, M. (2011) *The Digital Scholar: How Technology Is Transforming Scholarly Practice*, Bloomsbury, London.