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Social media use among pre-service primary teachers

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Keywords

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Editor's Note: Even in primary schools, students are more competent than their classroom teachers in use of new technologies. Over the generations, students helped teachers to use motion picture projectors, video recorders, and computers in the classroom. Even today's teachers, drawn from a technology savvy culture, are still discovering how to use WEB 2.0 tools to support teaching and learning. This study provides valuable data on social networking tools used by students and their potential value for education.

Social media use among pre-service primary teachers

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Abstract

This research explores preservice science teachers' social media practices as a first step in considering how to better utilize these tools in preservice teacher education. This is an important issue as these teachers will work with the next generation of students, who are likely to be even more connected through technology tools. We report data from a survey called the *Social Media and Science Learning Survey* that collects information about proficiencies and frequencies of use for a variety of social media tools for learning science. Results are from a cohort of 119 Australian primary teacher-education students in the context of their first year science methods subject. Results suggest social media behavior is different between use for everyday and their science methods subject in preservice teacher education. These differences may offer insight into how to prompt preservice teachers to more effectively utilize social media tools for connected learning and ultimately as instructional technology tools in their own classrooms.

Keywords: Social media, Primary teacher education, Science teacher education, Science learning, Web 2.0 tools, Educational technology

Introduction

This research explores how preservice primary teachers in a science methods subject use social media resources to learn science content. Our interest in the topic stems from our experience in teaching science across a variety of contexts and our desire to build from our students' experience to engage learners with 21st century technologies. We see this engagement as significant for preservice teachers' learning science, but also for their skill and knowledge development as future primary school teachers who will be expected to effectively utilize instructional technologies in their classroom practice.

Perspectives

Social media technologies have become ubiquitous, connecting learners to each other and information and leading to a worldwide shift in how knowledge is created, stored and shared. We adopt Kaplan and Haenlein's (2010) definition of social media as software and web-based technologies that facilitate interactive dialogues and connectivity using the capabilities of Web 2.0 technology that allow for the creation and exchange of user-generated content. Examples include video sharing platforms (e.g., You Tube), photo sharing sites (e.g., Flickr) and social networking sites (e.g., Facebook, Twitter).

Historically the development of new technologies (e.g., language, mass production of books) facilitated humans to cohere into grander unities with emergent behaviour (i.e., cultural groups). In order to examine social media use as a 21st century technological phenomenon, we adopted Bunge's (1999) perspective that technology defines a culture in terms of its methods, theories and practices, In Attwell and Hughes' (2010) literature review of pedagogic approaches to using technology, a wide range of learning theories were summarized; however, their application in the area of creating pedagogies for learning with technology were not offered, perhaps because the

examples did not yet exist. Bates (2011) acknowledged "Web 2.0 tools are so relatively new to education that educators have yet to find new designs for teaching and learning that fully exploit such tools" (p. 26). We draw on these perspectives to position our work in preservice teacher education and how our students will be expected to adapt Web 2.0 tools and technologies in their teaching practices to engage the next generation of 21st century learners.

Social media will play a key role in education reforms to implement 21st century learning (Howard & Carceller, 2010; Rice, Thomas & O'Toole, 2009) and as teacher educators, we need to understand our students' current practices in using social media in order to profit from the widespread availability of such tools. Applying a critical lens is important too, as suggested by this Journal's editors: "Facebook…deserves intense and critical analysis" (Editor's note, Blattner & Fiori, 2009) and as teacher educators who work with 21st century learners, the current article offers grounding for this sort of analysis.

While Web 2.0 tools are currently being promoted to engage 21st century learners in science learning, research literature has shown that students in primary education generally study very little science in high school (see for example, Bennett, 2001; Tytler, 2008). We can also question the degree to which preservice teachers are technically proficient or competent in their use of Web 2.0 tools. Teacher educators and teacher education programs can potentially benefit from enhanced understanding of how preservice teachers use Web 2.0 tools for science learning in their degree programs. Thus, we ask the following research question: *What are preservice primary science teachers' social media practices?*

Methods and data sources

This study administered a survey called the *Social Media and Science Learning Survey* (Author, 2013), which asks students to rate themselves on their use of social media tools according to their perceived levels of proficiency (e.g. such as 'non-user', 'novice', 'competent' or 'proficient') in the context of learning science in their first year science methods subject and for everyday use. The survey is organized into several sections including quantitative (everyday use; science learning use in the methods subject) and qualitative (open-ended questions about media practices and science learning more generally). The survey defines levels of proficiency as follows:

Non-user: "Never heard of it or never used it"

Novice: "I've used it once or twice"

Competent: "I've got an account and I use it to mostly read content"

Proficient: "I frequently use this application to both read content and to contribute content"

Demographic questions seek basic information regarding age group, gender and internet access. The survey was developed as part of an international collaboration where focus groups in Canada asked physics students about the kinds of social media tools that they used and how they used them to support their physics learning (Author, 2013; Moll & Hengstler, 2012). We adapted this survey for use with preservice teachers studying a science methods subject to compare university and everyday use of social media tools. The potential gap between these uses may offer guidance about how teacher education programs could better utilize capacities and proficiencies of these students for university learning.

The survey was administered to a cohort of 150 preservice primary education students present at the weekly lecture in October of the Spring term in a subject called K-6 Science & Technology: Curriculum and Instruction. Instructors in the subject are part of the author team for this paper. Survey administration was in accord with the university's ethics protocols and 119 surveys were returned completed, representing a 79.3% return rate. All data were entered into SPSS, which was used to conduct descriptive analyses.

Results

Data and analysis from the survey where preservice teachers offers a glimpse into their use of social media tools and techniques as they learn science in the context of their science methods subject during the Bachelor of Education degree program. This section begins with a summary of demographic information and then presents survey results on students' perceived levels of proficiency and frequency of use for various social media applications. The second section considers how these students reported using the social media tools for everyday use. In synthesizing these results, we discuss usage patterns for this group of learners, which could help us as teacher educators to understand both these students' science learning needs and how to help develop technical proficiencies into pedagogies for teaching in their future classrooms.

Demographics

Demographic questions on the survey asked for gender, age range and devices that participants used to connect to the internet. Table 1 shows age range and gender data for this cohort of first year students.

Table 1
Participant Age Range and Gender Data Summary

Age (yrs)	<19	19-25	26-35	>35	Total (%)
Participants	35	68	12	4	119
(%)	(29.4)	(57.1)	(10.1)	(3.4)	(100)
Female	28	56	8	4	96 (80.6)
Male	7	12	4	0	23 (19.3)
2012 Cohort	99	105	24	5	232
(%)	(42.7)	(45.2)	(10.3)	(2.2)	(100)
Female	83	87	16	4	189 (81.5)
Male	16	18	8	1	43 (18.5)
Australia	116534	131816	27700	23748	299 801
N=299 801	(38.9%)	(43.9%)	(9.2%)	(7.9%)	(100)
Female	(a)				168788 (56.3)
Male					131013 (43.7)

(a) Note: Data were extracted from census reports and do not include gender breakdown across age ranges (Commonwealth of Australia, 2012). Age distribution data are from the Australia-wide cohort of university entrant students in 2012.

Participants include 96 female (80.6%) and 23 male (19.3%). The female to male ratio of this cohort is very nearly the same as the program's 5-year average for first year intake (81.4% female, 18.6% male), slightly different from the entire first year cohort at the University of Wollongong, and noticeably different from the Australia-wide population of first year university students. The category of Under 19 students is underrepresented in the participant sample, while the category of 19-25 year olds is slightly overrepresented in the study sample. Anecdotally we are aware that Under-19 students are the ones most likely to miss lectures, and thus would not have been present during survey administration.

In addition to basic demographic data, the survey asked participants to indicate which of the listed devices were used to connect to the internet. Most students reported multiple devices and Table 2 presents these data. Results show that students utilize multiple tools to connect to the internet, with laptop computers and smartphones used most commonly. The survey does not ask respondents to specify where each of these devices are predominantly used, although some conclusions can be drawn from the particular device (e.g. desktop computers are used at home; campus computers are available in the university library). Other devices included: 'normal phone', mobile phone and 'PS3.'

Table 2
Numbers of participants and ways they connect to the internet (N=119)

Device	n	Device	n	Device	n
Smartphone	98	laptop	111	desktop/home computer	60
iPad/tablet	31	iPod	37	on-campus computer	62
other	3				

Proficient/competent use of social media tools in university science learning

In this section, we present data on students' reported levels of proficiency in using social media tools and discuss how the tools were used. Table 3 reports data across the quantitative sections of the *Social Media and Science Learning Survey* for our participating first year Primary Education students. Despite the wide research literature that suggests the 'net generation' are digitally savvy and learn in different ways because of their high levels of connectivity (Prensky, 2001a, b), we were surprised by the overall limited use by our preservice teachers of social media tools for learning in this science methods subject. We see this by way of comparison to these students' use of social media tools in everyday life, analyses that are offered in the next section. Survey results are presented in Table 3 as a percentage of participants who reported either 'proficient' or 'competent' use for each of the tools surveyed for either university science learning or everyday use.

Data presented in Table 3 demonstrates that preservice teachers felt most capable with social networking (SN, 59%), videosharing (VID, 47%) and the Learning Management System (LMS, 38%) for science learning. Students reported they felt less competent with document management tools, such as Google docs or Dropbox (DOC, 22%), wikis (W, 19%) and communications tools, such as MSN Chat (COMM, 18%). Table 3 also reports the mean values on the competence scale along with standard deviations. We note the high SD values for many of the social media tools and thus participant responses are highly variable. Recall that the competence levels for each application were indicated on a 4-point Likert scale that we converted to numeric values for analysis (0=never used it; 1=novice; 2=competent; 3=proficient).

Social networking (e.g. Facebook) was the application that had the highest number of preservice teachers reporting proficient or competent use for science learning (59%, mean=1.75, SD=1.14). This is a fairly high level of proficiency that perhaps should not be surprising. However, with the ubiquitous nature of Facebook and close to 100% using social media for everyday use, (98%, mean=2.75, SD=0.51) we wonder why just over half of our students reported such a level for science learning. Because this value is just over half of the students, we are led to wonder if most students do not use Facebook as a learning tool because they do not know how.

Of the 63 preservice teachers who commented on the open-ended questions asking how they used social networking tools for science learning, comments like this were typical: "We have a Facebook group with *primary ed* people and we ask each other questions" or "[I] ask friends for information on the assignments." We note that 56 students did not offer a response to this question, which suggests that Facebook (FB) (or other sites for social networking) are only used in a limited way (if at all) for science learning. Further, there were at least two FB Groups that our B.Ed. students joined in relation to their university studies: the primary year-group B.Ed. Facebook Group (to which the quotes refer) and a subject-based FB group that was set up at the beginning of the term by the instructors in the science methods subject at the center of this research.

Table 3
Social Media Proficiency Data Summary:
Use in University and Everyday Contexts

	University Science use			Everyday use		
Social Media	Comp	Prof/ mean	SD	Comp	Prof/ mean	SD
Social networking (SN)	59%	1.75	1.14	98%	2.75	0.51
Communications (COMM)	18%	0.54	1.00	47%	1.41	1.00
Blogs (BL)	7%	0.20	0.61	19%	0.72	0.11
Microblogs (MBL)	4%	0.13	0.48	14%	0.56	0.96
Document mgmt (DOC)	22%	0.66	1.07	34%	1.10	1.10
Soc bookmarking (SB)	6%	0.17	0.54	7%	0.27	0.66
Social news (NEWS)	3%	0.13	0.46	9%	0.37	0.75
Wikis (W)	19%	0.93	0.99	57%	1.63	0.93
Videosharing (VID)	47%	1.39	1.12	78%	2.07	0.88
Livecast (LIVE)	11%	0.32	0.79	51%	1.49	1.16
Music sharing (MUS)	5%	0.18	0.53	24%	0.80	1.01
Photo sharing (PH)	7%	0.24	0.65	21%	0.74	1.03
Discussion forum (FOR)	16%	0.50	0.85	32%	1.06	0.99
Learning Mgmt Sys (LMS)	38%	1.08	1.24	n/a	n/a	n/a

Competent: "I've got an account and I use it to mostly read content"

Proficient: "I frequently use this application to both read content and to contribute content"

In describing how they used social networking for science learning, some participating students made reference to the subject's Facebook group: "Info for assessments has been put onto the Facebook page." All students in the subject were invited to join the subject group (and about half did). The instruction team used the subject's Facebook Group to share information, events, photos and resources with students. We monitored the site, made regular contributions and invited students to do the same. By the end of the term, 120 (of 215 enrolled students) had joined the subject-based group. Some students shared resources they had found or posted videos of their weekly lab activities on the subject's Facebook site. Other students asked questions and hoped their classmates would answer them. Many of the questions were logistical regarding dates and

times for events or meetings, interpretations of assignment criteria, or working on a group project together. Interestingly, the other Facebook group for the first-year cohort was more widely subscribed than the subject-based one, and it should be noted that the instructors were not invited to be part of this group.

About half of our preservice teachers reported proficient or competent use of videosharing sites such as YouTube (47%). With a mean competency reported at 1.39 (SD=1.12), competency is also highly variable. Participating preservice teachers commonly used videosharing sites to search for ideas or examples for assignments or to try to understand a science concept (for example, density or 'how things work'). This was a similar finding to what Moll, McDaid and Linder (2012) reported with their university physics learners. A small number of the current study's participants reported posting their own videos on YouTube, and one student used YouTube to store a video under construction for an assignment.

The university's learning management system (LMS) was included on the *Social Media and Science Learning Survey* because it includes a discussion board, document management tools, information posts, lecture notes and assignment details and thus can be used in Web 2.0 ways like other social media applications. Students reported accessing the university's LMS for a variety of uses, but most of these were for gathering information about the course rather than 'learning' activity, per se. We were surprised by the small percentage of students (38%) who admitted proficiency or competence with the Learning Management System given that all course materials were posted electronically. The mean of 1.08 (SD=1.24) suggests that many students reported competence levels as 'novice.' This may not be surprising given that the population for this study is first year university students. However, this is the system wherein students register for courses and subjects, check their university email and view their student records and marks, as well as log in to collect lecture notes and study resources. Further, administering the survey in Week 10 (Spring term, early October) meant these students were nearing the end of their first year of university studies. Every student should have accessed the LMS at least twice for this subject, thus, more students should have identified a level above 'novice' ("I've used it once or twice") depending, of course, on how they interpreted the survey item: "Have you used this application to support your science learning in the subject?"

It may be that the students used Facebook in the way that they should have been using the LMS. It appears that the students used the cohort FB group (and not the subject-based FB group) to communicate with one another about subject-specific information. The possible problem may be that in relying on each others' interpretations of course materials or events, there may be misinterpretations or incorrect information promoted. In a way, this is a power struggle between course instructors and students: students prefer to use FB as a communication tool. However, it is not the official university channel for communication and instructors are rightfully reluctant to post everything in two places (one official and one unofficial). And, not all students subscribe to Facebook (or take up the invitation to join a group). Changing (or promoting) student behavior consistent with university policy is another matter. This seems to represent a tension similar to that reported by Watkins (2009) that young adults do not use email, and so, despite a university expectation that students regularly access the university email ("SOLS" or Student On-Line System, specified in the Acceptable Use Agreement as the official channel for communications with students at the university), our data suggest that they do not. The communication tools on the university LMS may be treated similarly to the way young adults consider email: old-fashioned or out-moded (Clark, Logan, Luckin, Mee & Oliver, 2009; Watkins, 2009). The LMS also has document management tools to which students have access, but no students accessed these for the current subject.

A portion of participating students reported proficient or competent levels of use for web-based document management applications such as 'Google Docs' (22%). According to the mean and

standard deviation (mean=0.66; SD=1.07) for these social media tools, competence is again highly variable, but lower overall than for other social media tools. Students also reported how they used document management tools for university science learning. The common uses reported were "sharing" and "editing" for group assignments, which suggests some use of social media tools for learning activities. Interestingly, the science methods subject includes a final task that is a group task, but this had not yet been assigned, thus students would likely not have started work on the group assignment when the survey was completed. Thus, the students were likely reporting document management tool use for university subjects other than science.

A total of 19% of our participating students considered themselves to be proficient or competent using wikis to support their science learning. Again, from the mean and standard deviation (mean=0.93; SD=0.99), competence levels are highly variable and mostly low-level. Most commonly, students visited Wikipedia to look up 'quick facts', definitions, background information or to gather ideas for assignments. It is interesting to note that although Wikipedia and wikis are intended to be social tools for collective knowledge generation, none of the participating students said that they had contributed content to a wiki. This suggests that they more often used this social media tool in a Web 1.0 or passive, conventional way, rather than in a connected way that takes advantage of the technology to build collective knowledge. This is perhaps not surprising, but from this we can justifiably ask about student knowledge of the tools, including what the tools are intended for, how learners position themselves within a community of learners, how they imagine possibilities for tool use, or how they use the tools effectively for personal learning activity.

Comparisons to everyday use

The *Social Media and Science Learning Survey* also asks respondents to identify their levels of proficiency with the same range of social media tools in everyday use (refer to Table 3). In this section, we offer comparisons to our participating students' reported levels of proficiency for university science learning. While we saw only medium levels (at best) of proficiency or competence on the social media tools among our preservice teachers for university science learning, participants reported much higher levels of proficiency or competence with the same social media tools in their everyday lives. For example, 98% of the students reported proficient or competent use with social networking tools such as Facebook (mean=2.75; SD=0.51). Recall that 59% of participants reported proficient or competent levels of use for university science learning with Facebook. Reported proficiency levels for other tools were likewise higher than for university science learning and perhaps suggest a similar lack of understanding of their possible use in science/university learning: videosharing (78% vs. 47%), document management (34% vs. 22%), wikis (57% vs. 19%), livecasting (51% vs. 11%) and communications (47% vs. 18%). Across the entire range of social media tools included in the *Social Media and Science Learning Survey*, our students reported more competent everyday use as compared to that for science learning in university. We also note somewhat less variability in competence levels reported in means and standard deviations for these tools in everyday use.

Consistent with reports of Web 2.0 tool use in the research literature, these results suggest that individuals use a wide array of social media tools, but only in limited ways when it comes to learning (Clark et al., 2009; Watkins, 2009). This difference likely reflects a personal preference for a particular range of preferred applications and that individuals choose to utilize particular applications for reasons beyond science learning, possibilities that we are exploring in further correlational studies.

Synthesis

Participating students will be primary teachers at the end of their Bachelor of Education degree. As a group, they are often characterized by their limited science content knowledge (Davis,

Petish, & Smithey, 2006; Goodrum, Hackling, & Rennie, 2001) and our efforts as science methods subject instructors in preservice teacher education are key to building background knowledge to support them to be science teachers (Appleton, 2006). Further, while we may imagine that our preservice teachers are 'digital natives,' their use of Web 2.0 technologies for science learning are limited as noted in this study, which confirms the claim by Bennett and Maton (2010) that we cannot assume our students are digital natives. Participating students in the current study are clearly fluent with a number of social media tools, as demonstrated by the results around their everyday use. And, as we noted in the demographic section, if anything, our data underrepresents the youngest of our preservice teachers who have come to university directly from high school. Thus, we can surmise that levels of everyday proficiency among our sample population are underestimates of the larger population of first year teacher education students. We believe that the patterns noted in this paper lead to some implications for our work as teacher educators.

Untapped Potential

From the many social media tools considered in this study, we have seen our students' everyday proficiencies of use range from novice to competent, which was a large difference to how our students view their proficiency levels with these same media tools for their science learning. It may be as Mendez et al. (2009) reported, that even though social media use continues to grow, university students prefer to use these tools for social communication purposes rather than interactions with instructors or each other as learners. This limited use and/or engagement with social media tools for learning science represents an untapped potential for utilizing these tools as pedagogical resources in teaching. Further, the tools could be utilized more for sharing resources for teaching and developing understanding. Because virtually all learners are proficient or competent to perform basic functions on a wide range of social media tools using a wide range of internet-accessible devices, teacher educators should attend to these levels of potentiality.

Affordances for Tasks and Assignments

While preservice teachers are learners in a university degree program, there is opportunity for instructors to utilize social media tools in tasks and assignments. There is opportunity to develop creative tasks and assignments that require students to utilize the connectivity of, for example, document sharing tools such as Google Docs or videosharing sites such as YouTube. Document sharing sites offer collaborative tools that enable groups of learners to work asynchronously or synchronously toward a group product (and some of these tools have been used for many years in distance learning settings). We suggest that models exist for the types of tasks that could be integrated into teacher education in face-to-face settings that utilize the affordances of social media tools given the students' fluency with and access to Web 2.0 technologies and applications.

Conclusion

As teacher educators and researchers, we are confident in the claim that a majority of our participating preservice teachers were limited in their ability to use social media tools to support their science learning. Further, this suggests that there is a window of opportunity within teacher education to develop the learning potential of social media tools in our teacher education programs. This could readily take the form of designing tasks and assignments that require students to work with the affordances of various tools. This could help them develop the technical and pedagogical proficiency to utilize more of the potential offered by the variety and ubiquity of social media tools for learning.

We could lament the slow and/or limited uptake of the connected possibilities of Web 2.0 technologies for learning in science and science education, but there is a long history of teacher education programs (and education systems more generally) being slow to respond to societal

changes (Beck & Kosnick, 2002). We suggest that instructors must develop creative responses to the ubiquity of the new technologies, and instead of worrying over whether our students are 'digital natives' or not (or what they can or cannot do), we should 'return to the basics' of pedagogy: model teaching practice and strategies, build authentic assessment tasks and continue to develop our understandings of our students as learners in this 21st century world. In other words, teacher educators need to scaffold the kinds of uses of social media tools that help our preservice teachers bridge their social and learning worlds. By extension, classroom teachers likewise must adopt changes in their own practices to both understand their students and utilize the potential of social media applications as tools for learning in the 21st century.

While young adults commonly use social media for basic communications in a social sense, we see great potential in building a bridge between social use of social media applications and deliberate attention to learning science. Further, these young adults will be teaching the next generation of children, whose digital proficiencies are likely to be even greater, thus attention at the program level in teacher education will have far-reaching consequences.

Educational importance of the study

This study provides an initial exploration of the social media practices of our preservice science teachers. Information about their practices can help us to support their learning science content in science methods subjects. We know that they extensively use social media for staying connected in terms of social interactions, but they are also beginning to use the variety of available tools for collaborating on assignments and discussing challenges within their university learning environments. We would like to know more about how to harness the connectedness possible with social media tools to foster the kinds of learning behaviors among our students that help them deepen their understanding of concepts, but also for these teachers' future use as primary classroom teachers who will teach science, technology and a range of other subjects. Along with policy recommendations, such as those from the OECD (2012), we see this as significant for preparing them to teach in the 21st century. Our own research will continue to examine how, as instructors in teacher education, we can better utilize the learning potential represented by the social connections that Web 2.0 technologies enable. Others in similar contexts would also be advised to consider how to be more deliberate in efforts to teach and support students to build and harness this important social connectedness for learning.

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