Riding the Wave of Social Networking in the Context of Preservice Teacher Education

Kate Highfield and Marina Papic
Macquarie University
AUSTRALIA

Abstract

This study examined the use of one online social networking tool, NING™, in teacher education, highlighting preservice teachers' engagement and perceptions of the tool. Data obtained from 91 preservice teachers suggest that they found the multimodal platform useful as a tool to build pedagogic and content knowledge. Responses to surveys and online forums indicated potential benefits of social networking in higher education with preservice teachers indicating that this tool enabled increased control of their learning. Personalization and capacity to control and contribute multimodal responses were seen as effective in developing a learning community in a diverse cohort of higher education students.

Increasingly teachers are required to be confident users of technology. Preservice teacher education programs are called up to develop their students' 21st-century skills, including information, media, and information and communications technology (ICT) literacies (American Association of Colleges for Teacher Education & Partnership for 21st Century Schools, 2010; Rotherham & Willingham, 2009). The statement, "If you're not riding the wave of change you'll find yourself beneath it," (author unknown) is effective in capturing the idea that technological innovation presents a constant challenge for educators. Further, a near constant wave of innovation appear to be on the horizon.

This article examines one of these technologies in teacher education, embedding the use of social networking tools in an undergraduate teacher education unit. Given the rapid growth of social networking tools and the increasing prevalence of the offering of courses through online delivery, this study provides critical data supporting the use of an online tool in tertiary education. Within this project the online tool NING™ (http://www.ning.com) was used with 91 preservice teachers from an Australian 4-year university degree program in education, with a particular focus on embedding technology in student learning and examining the affordances of this tool for student engagement.

NING™ is an online medium used to support online discussions using multimodal tools. It also enables the development of a learning community. Working with a specific cohort of preservice teachers enrolled in a compulsory mathematics, science, and technology course, this online social-networking tool promoted student teachers' technological pedagogical content knowledge (sometimes called technology, pedagogy, and content knowledge, or TPACK; Koehler, Mishra, Akcaoglu, & Rosenberg, 2013; Mishra & Koehler, 2006). Integration of NING™ enabled preservice teachers to develop their own skills in purposeful uses of technology, while also developing specific skills and confidence utilizing Web 2.0 tools.

Given the increasing prevalence of online social networking tools such as Facebook (http://www.facebook.com), Instagram (http://www.instagram.com), and the micro blogging site Twitter (http://www.twitter.com), the world is increasingly connected. Educators working with preservice teachers must acknowledge the context in which their students will be working. Although many people assume that preservice teachers are "digital natives" (Prensky, 2006) and, as such, confident with technology use, given the diverse cohort of preservice teachers including mature aged, international, and rural and remote learners, such an assumption is naive.

This project explored one cohort's use of this Web 2.0 tool and examined preservice teachers' perceptions of both the affordances and limitations of social networking as a tool for learning in the area of mathematics, science, and technology. This study highlighted the potential for embedded uses of technology in teacher education programs for enabling the development of TPACK.

Literature Review

The concept of educators working within a learning community has longstanding relevance in education. Drawing on socioconstructivist approaches (Vygotsky, 1978), many educators are adept at creating face-to-face communities of learners. Here, the aim is that learners work together, with each acting as agents in learning. A robust literature base, including the work of Tinto (2000) and Gavelek and Raphael (1996), supports the concept of learning communities as advantageous in increasing engagement and enriching learning. In the following quote, Tinto (2000) highlighted the key role of learning communities:

By asking students to construct knowledge together, learning communities seek to involve students both socially and intellectually in ways that promote cognitive development as well as an appreciation for the many ways in which one's own knowing is enhanced when other voices are part of that learning experience. (p. 49)

Kong and Pearson (2002) added to this concept by emphasizing the cultural context of knowledge, suggesting that learning occurs when individuals interact "with more knowledgeable members of a community within specific social, cultural, and historical

contexts" (p. 2). However, when students are separated by geographic distance or study through mixed modes of learning (e.g., on campus face-to-face vs. online), creating robust communities of learners can be a challenge. This article draws on the benefits of a learning community and provides insights into how technology can be harnessed to build it.

Using technology as a tool to transform teacher education programs has been a growing area of research, with a range of studies examining the use of tools and technologies in teacher education programs (cf., Hughes, Gonzales-Dholakia, Wen, & Yoon, 2012; Jackson, 2012; Jimoyiannis, 2010; Kay, 2006; Lloyd, 2011; Madson, Melchert, & Whipp, 2004; Norton & Hathaway, 2012; Ottenbriet-Leftwhich, 2012). Herrington, Reeves, and Oliver (2014) suggested that the use of online learning management systems and social networks provide a context for learning and opportunity for more authentic engagement.

However, Lim, Chai, and Churchill (2010) noted that one key finding arising from this growing body of research is that despite the potential benefits of online platforms many teacher education programs include limited use of technology for pedagogic purposes. For example, programs may simply use learning management systems to deliver content or communicate information rather than to engage in the development of a learning community.

Mishra and Koehler (2006) presented the TPACK framework to examine educators' integration of technology in relation to pedagogical and content knowledge. This framework highlights the complex interplay between content knowledge, pedagogical knowledge, and technology integration (Mishra, Koehler, Zellner, & Kereluik, 2012).

This framework is useful as a tool to help preservice teachers to move beyond the focus on the "development of technical skills" (Jaipal & Figg, 2010, p. 420) or subject specific technology use (Jimoyiannis, 2010). Further, Abbitt (2011) recommended that TPACK be employed for promoting technology use "in the process of teaching and learning in a truly integrated manner" (p. 283).

Although the use of technologies in teaching and learning to enable multimodal communication is not new, Ryan and Lloyd (2003) suggested that "new technologies have formalized this, and in so doing have acted to mediate the interaction between teachers and students, students and students, and students and content" (p. 1). Through the use of synchronous and asynchronous discussion forums, teachers and preservice teachers can focus on tasks that develop content and pedagogical knowledge. The technology is used as a tool to mediate and formalize learning, with online discussions acting to guide and scaffold learning.

One specific form of technology useful in the development of online learning communities is social networking. Lockyer and Patterson (2008) defined these social networking tools as having features such as the ability to

> share personal information through their profile, connect with other users of the sites who might be known as contact or friends, upload, tag and share multimedia content that they have created, link others to a variety of web-accessible content, initiate or join sub-sets of user groups based on common interests. (p. 529)

Social networking has the potential to enable users to communicate, share resources and ideas, and engage in peer feedback (Selwyn, 2007).

Research on the use of social networks in teacher education programs is growing, with a range of researchers examining these tools in preservice programs and adult learning contexts (Hughes, Ko, Lim, & Liu, 2014; Kimmons & Veletsianos, 2014). These projects examine myriad tools, such as Flickr (Lockyer & Patterson, 2008) and Facebook (English & Duncan-Howell, 2008), with few using the customizable platform of NING™ (Quong & Snider, 2012). Several of these studies focus on student use of social networking in their personal lives (Bowers & Kumar, 2015) or their perceptions of social networking and its potential for use when teaching (Hughes et al., 2014).

Despite this research, additional studies in this area are needed, particularly those that focus on the use of specific tools to extend engagement in learning and integrate the opportunities for the development of learning communities. This project builds on this research base and examines the social networking tool NING™ in one teacher education program.

Research Questions

To what extent does a social networking tool afford preservice teacher engagement with content and online interactions that support and extend learning?

- What aspects of NING™ do preservice teachers perceive to be useful for their learning?
- In what ways does the online social networking platform NING™ facilitate or hinder the development of a learning community?

Methodology

Context

Young children's mathematics, science, and technology is a compulsory course within the early childhood bachelor of education degree program in an Australian university. The course is offered both online and face to face. Both options provide preservice teachers with a blended mode of delivery, which includes a mixture of weekly interactive lectures, online discussion forums, and tutorials. Online students participate in tutorials over an intensive 2-day, on-campus session. On-campus students attend face-to-face weekly tutorials over a 10-week period.

Online preservice teachers access lectures through the university's learning management system. The blended mode of delivery provides various opportunities for learners to construct knowledge socially and ensure a greater focus on "pedagogical transformation and renewal in learning paradigms due to the prevalence of technology-rich learning environments, and blended designs that incorporate both face-to-face and technology-mediated learning" (McLoughlin & Lee, 2008, p. 642).

Throughout the course the preservice teachers in this study addressed three intersecting modules: mathematics, science, and technology. They completed a range of learning activities for each of the modules, including lectures, tutorials, and onscreen tasks. As this was a new technology trialled with preservice teachers, they were supported through small-group training sessions and written and video instructions.

Sample and Participants

A group of 91 preservice teachers were purposively selected to participate in the study. All 91 participants in this study were in their second year of formal study in an early childhood education (birth to 8) bachelor's degree program. Fifty-six of the enrolled preservice teachers were studying on campus, with the remaining 39 studying online.

The participants, 89 female and two male, ranged in age from 19 to 55. All 91 preservice teacher participants participated in weekly online tasks. Of these, 31 agreed to participate further in the study by completing an online survey. Of the 31 survey respondents, 55% ($n = 17$) were over the age of 25 and 45% ($n = 14$) were enrolled as online students. Given that this survey was a voluntary component of a student unit, it was not possible to mandate participation for ethical reasons.

Social Networking Tool: NING™

NING™ is a collection of online social networking tools allowing users to create specifically designed and individual networks. NING™ was selected for this study, because it allows a high level of customization and enables users to create either open or closed online communities. Within this project, the teaching staff of this course used NING™ to design and develop a closed social network, selecting and customizing tools and appearance, and setting levels of member autonomy.

A closed community was selected, as it is a university ethical requirement that students' privacy be respected. At the time of the research, this tool differed from other social networking in that the network creator can select forms of communication, such as discussion forums, blogs, photos, and videos, and can set up approval processes to moderate member posts as needed.

Procedures

Preservice teachers were informed of the use of NING™ within the unit outline, and optional training was provided through video instruction, face-to-face training sessions, and optional ongoing support through email or phone provided by the two teaching staff members working on the unit. Teaching staff members were also the researchers on the project and had previously taught this unit, one for 2 years and the other for 6 years. Throughout the semester preservice teachers completed 10 compulsory weekly reflections, where they were required to respond to provocations (i.e., an image, video, or discussion point designed to provoke discussion).

Compulsory weekly reflections. Preservice teachers were asked to complete weekly reflections. Most utilized the multimodal potential of this platform and formed part of the formal assessment of this unit. For example, in 4 of the 10 weeks, preservice teachers were provided with photos and videos of children engaged in mathematical problem-solving tasks and a description of an associated learning scenario. The remaining 6 weeks were text-based only (no video, images, or multimodal elements used) to determine if this form of provocation impacted the responses. Preservice teachers were required to respond each week, which provided an opportunity to link course content and associated research literature.

Optional posting and communication. In addition to compulsory weekly postings preservice teachers were able to contribute through online forums and discussion

threads. These informal contributions were not compulsory and did not form a component of the assessment requirements.

Survey. At the conclusion of semester preservice teachers were invited to complete a deidentified survey through the online tool Survey Monkey™ to ascertain their perceptions of technology integration using the NING™ online learning platform. The survey was open during the last 3 weeks of the semester and took approximately 20 minutes to complete. The researcher-designed survey comprised 31 questions: 16 multiple-choice questions, four short-answer questions, and 11 rating responses. Participants had the opportunity to provide additional comment at all stages of the survey.

The survey identified demographic data (e.g., age bracket, study mode, and year of study), required preservice teachers to rate themselves (e.g., their confidence in using the university's learning management system and social networking, generally) and examined student perceptions of online tools (e.g., the extent to which photos stimulated their engagement and enhanced their pedagogical content knowledge).

Data Collection and Analysis

The project obtained ethical clearance from the University Human Research Ethics Committee. All participants received information sheets outlining the research project. Participants provided written consent if they were willing to participate. Four different sources of data were collected throughout the study, enabling triangulation of data and robust analysis:

Training and support. We recorded the number of preservice teachers participating in face-to-face training and accessing ongoing support. These data were used as an indicator of preservice teacher confidence in accessing and engaging with social networking tools.

Survey data. Survey data were collected examining student experience and student perceptions of using NING™ as a component of their teacher education program. These surveys provided quantitative data, which were supported by analyses of qualitative data (preservice teacher online postings and researcher reflections) collected from both preservice teachers and researchers.

Online postings. Preservices teachers' online postings were analyzed with a focus on the quantity and type of responses to weekly and additional postings. These data provided evidence of student engagement and the development of a learning community. These data also included student responses to the types of provocation.

Researcher discussion groups. Researchers' reflections on student participation in online postings through weekly staff discussion groups gave further insight into this engagement.

All quantitative data were analyzed using descriptive statistics. Qualitative data were analyzed using an inductive approach using thematic content analysis.

Results and Discussion

Demographic data were obtained through the online survey, providing background to current student engagement with social media. This data showed that a significant proportion (84%, n = 26) of preservice teachers used online social networking tools in their private lives, with 65% (n = 20) of preservice teachers reporting spending more than 2 hours of personal time each day engaged in social networks online. In particular 23% (n = 7) spent more than 3 hours. These data are slightly higher than national statistics, where approximately 54% of adults are active (daily) users of social networks.

Preservice teachers demonstrated a confidence in using ICT, generally, with only 12 choosing to attend the face-to-face introductory sessions (explaining how to use the social networking tool). Of these, 92% (n = 11) were classified as "mature-aged (in this study mature-aged was classified as over 24 years of age). Further, after this initial training no student requested technical support from academic/research staff except in relation to password issues. The minimal technical support required provides evidence of students' level of confidence in communicating through the online tool.

Research Question 1

Data examining preservice teacher engagement highlights the potential of social networking to support and extend learning. Multiple data sources, which included survey data, quantitative analysis of student postings, and researcher reflections, substantiated this potential. For example, 10 posting threads (topics of conversation where preservice teachers responded in a linked discussion) started by teaching staff members over the course of the semester related to compulsory weekly tasks.

Analysis of the data indicated that multimodal posts (i.e., posts that incorporated video, images, text, hyperlinks and sound rather than focusing on text alone) appeared to be the most effective in stimulating responses from the participants, particularly encouraging preservice teachers to make connections between theoretical content and their own teaching experiences. Researcher discussions noted apparent increases in links between theory and practice when compared to previous years where a traditional learning management system was utilized.

The following excerpt, part of a longer forum post, is representative of typical student responses, where connections were made between theory and practice:

> To begin with I would ask probing questions (NSW DoET, 2003) such as, "Can you explain what you've been working on?" To add to this activity, I would ask the child if she would like to recreate the picture on computer, either online with the National Library of Virtual Manipulatives Pattern Blocks, or by using MS PowerPoint (see image below as example). This will provide her with an opportunity to create pictorial representations of shapes (Davis & Keller, 2009), and experiment with spatial relationships (Charlesworth, 2005). (On campus student)

Specific online tools were seen to be particularly advantageous. The following section outlines specific tools to support and extend learning.

Research Question 2

Images, video, and links to external websites and resources were perceived as particularly useful for preservice teachers in their learning, as evidenced by discussion forum postings. Data indicated that multimodal provocations were more likely to result in preservice teachers extending discussion beyond set discussion points. For instance, preservice teachers frequently shared additional resources or contributing images, hyperlinks, and video as exemplars of their postings. Figure 1 provides an example where the participant added the hyperlink to additional resources and used text combined with images to provide explanation of scientific content and support knowledge construction.
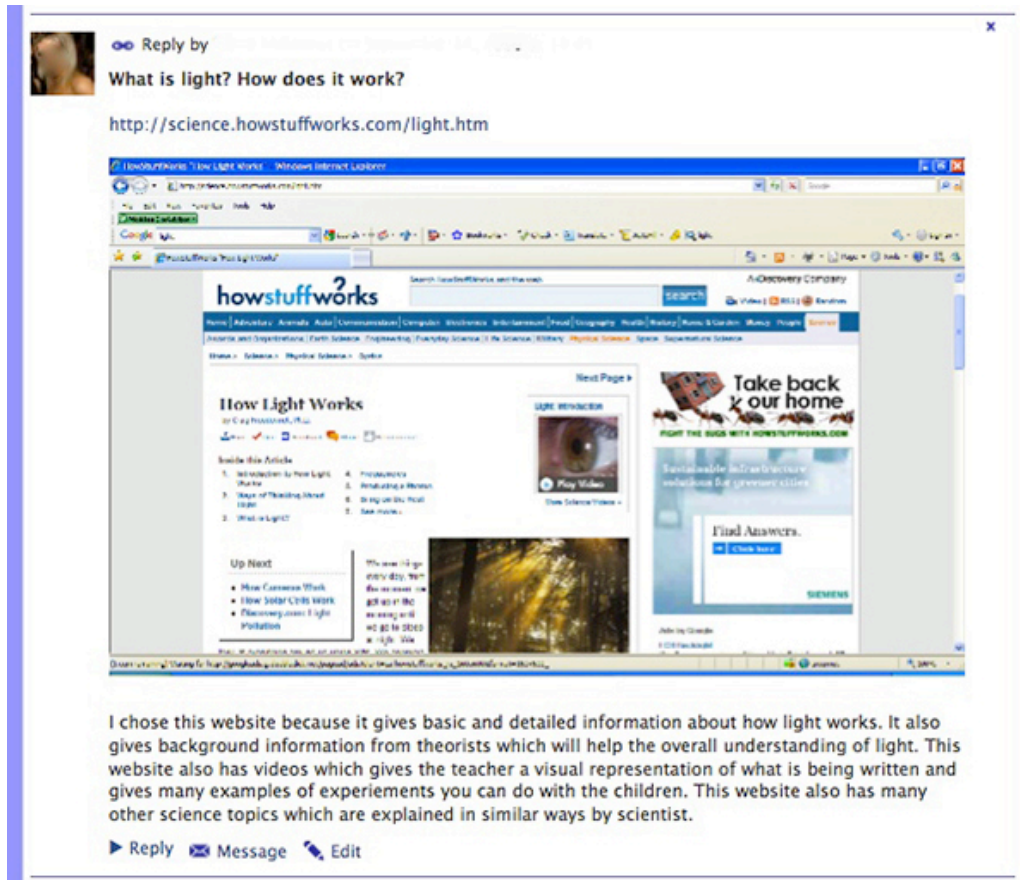

Figure 1. *Example of participant discussion, embedding hyperlink and image from a website to support knowledge construction.*

The survey data also supported the benefits of using images and video. When asked to respond to the effectiveness of NING™ to provide digital resources to promote discussion, all preservice teachers who responded to the question (*n* = 28) indicated that it was an effective platform. Fifty percent of the preservice teachers who completed the survey question chose it as the most effective (the highest category of 6) and 93% (*n* = 26) selected one of the top two categories.

Besides the effectiveness of the NING™ tool to enable access to these digital resources for discussion, preservice teachers described feeling that it added value to their learning. Preservice teachers perceived that it had a positive effect both on engagement (89%, 17 out of 19 respondents) and on building pedagogical and content knowledge (91%, 21 out of 23 respondents; see Figure 2).
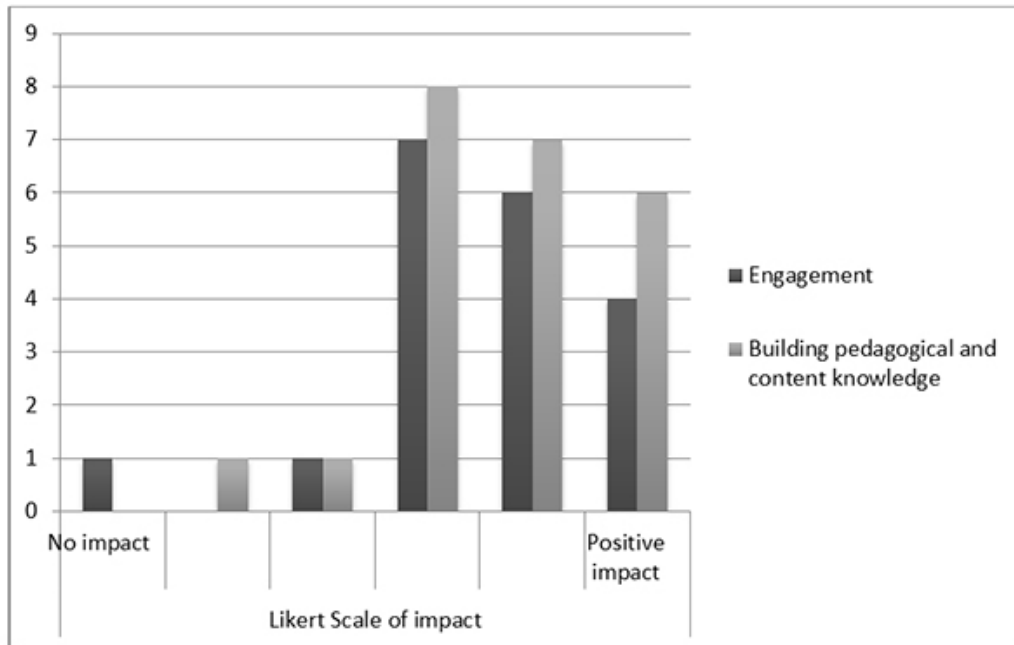
Figure 2. *Preservice teacher perception of impact of digital content as a discussion stimulus.*

The following excerpts from participant open-ended survey comments exemplify this affective response:

- "A picture was worth a thousand words after all."
- "NING is a lot more visually inviting, and the use of photos and other multimedia seems to encourage more general discussion and sharing of ideas related to subject, rather than just assignment issues."

The responses that were less than positive about the use of photos and videos appeared to result from participants' limited Internet access, as the following survey comment illustrates: "I was never able to use the video with ease due to poor Internet speed." Quotes such as this one reflect connectivity issues rather than specific concerns with the tool. For preservice teachers where connectivity was not an issue the online tool apparently facilitated development of a learning community.

Research Question 3

The online social network tool appeared to support the development of a learning community and the advancement of preservice teacher skills and learning. No data

indicated that the tool hindered online engagement. Unlike traditional pedagogies and learning management systems, NING™ appears to promote construction of knowledge through creation of and participation in student-led discussions. Although student-led discussion is possible in social networks and in some learning management systems, for this cohort of preservice teachers this experience was a new addition to their academic learning. This result is attributed to both the affordances of the tool and the similarity of NING™ to other social networks such as Facebook.

Analysis of researcher discussions anecdotally demonstrated an increase in preservice teacher initiated discussions when compared to previous years where a traditional learning management system was utilized. Figure 3 supports this conclusion, with preservice teachers indicating that they believed they had increased control of their learning through NING™ when compared to a previous learning management system.
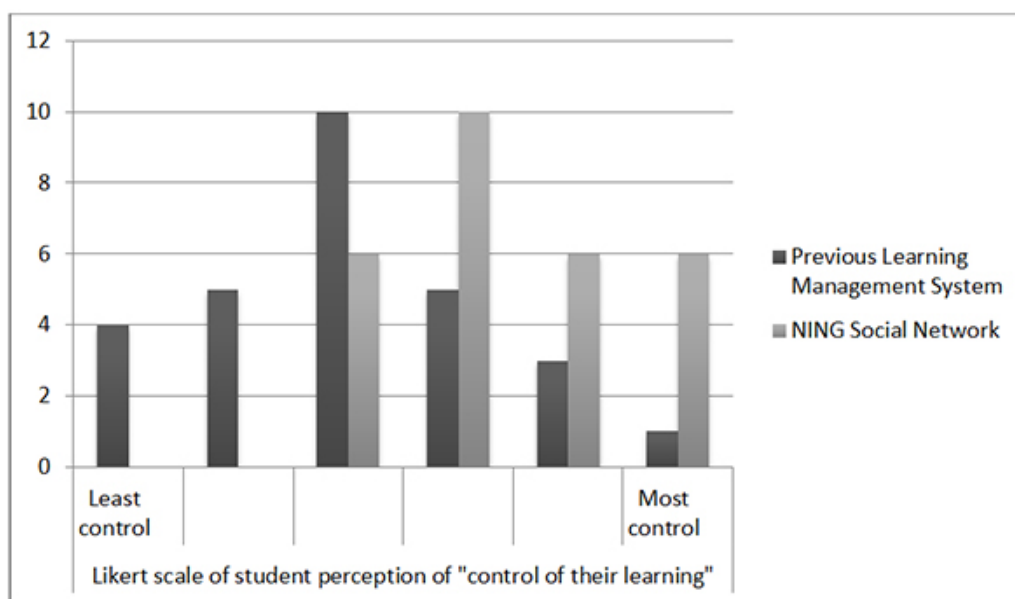

Figure 3. *Preservice teacher perception of control of learning: Comparison of learning management systems.*

This cohort of preservice teachers added 54 independent discussion threads. These discussion threads initiated conversations that predominately extended online learning. Interestingly, only 16 participants were creators of these discussion threads. Of these student-created posts, 43% (n = 23) were communicating teaching ideas, web links and resources. Another 37% (n = 20) of additional posts were related to general course and university questions or comments. The next highest type of discussion post (17%, n = 9) was giving an opinion, reflecting personally, or asking for opinions.

These data provide evidence of the potential of a social networking tool such as NING™ to support the development of learning communities. It also highlights the capacity of the tool to support those in the learning community to steer the direction of content. When students have a voice in actively guiding the learning direction, student engagement and affective response to learning is also increased. Within this study preservice teachers

specifically steered tasks toward a practical application of knowledge, such as seeking input on resources (see Figure 4).
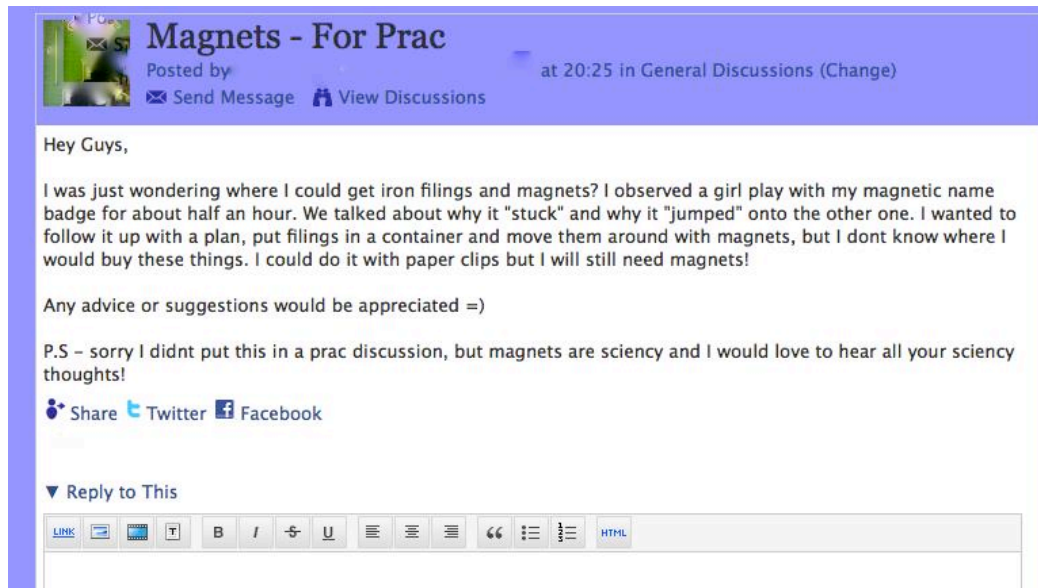
Figure 4. *An example of a preservice teacher guiding discussion.*

In addition to student control of learning, the use of NING™ promoted the development of a learning community and, in turn, contributed to a sense of belonging. The following excerpt from a survey response reveals one online preservice teacher's perspective: "As an external student, studying can be quite lonely. Using NING™ helped me feel 'unlonely.'"

This comment is particularly relevant because this preservice teacher had studied extensively online using the previous online management system. We had hypothesized that the use of photos in personal profiles was of particular importance to online preservice teachers and could help break down perceived barriers between on campus face-to-face and online modes of study. All preservice teachers changed their profile image to depict either an image of themselves or an image of something linked to them (e.g., an image of their family).

Additionally, 77% personalized their page in some way, such as adding photos or changing the visual theme. Participants noted their pleasure in being able to personalize their pages and the value this activity had on their development, as exemplified in the following survey response by an online preservice teacher: "Thanks so much for the personal nature of NING™. It has extended my use and abilities of I T. I love it!"

Preservice teachers also indicated increased ICT skills and expressed pleasure that their skills were extended:

- "I never thought I'd be able to do this, I'm a 'techno-phobe' – but I did!" (Mature-aged preservice teacher).

- "It took me a while to get used to it. I may be Gen Y, but I have always been anti-tech until this course." (on-campus preservice teacher)

This finding was supported by discussions arising among us, the researchers. However, we were somewhat surprised, because the preservice teachers had previously used a learning management system, so the use of the alternate NING™ platform had not been intended as a vehicle specifically to extend ICT skills. Possibly, these preservice teacher comments arose from more active engagement with digital content; however, we have inadequate data to confirm this notion.

Conclusions and Implications

Returning to the analogy initially espoused, as we seek to ride the technology wave, educators must move beyond what a tool affords and has capacity to do, into an analysis of whether a tool has the potential to support a positive impact on student construction of knowledge. In line with other research (e.g., Hughes et al., 2012; Jackson, 2012; Jimoyiannis, 2010; Kay, 2006; Lloyd, 2011; Madson et al., 2004; Herrington et al., 2014), findings from this study highlight the potential for the use of social networking as a tool for engaging students. While these findings are not intended to be generalized due to the small sample size, these data do add to the growing body of literature suggesting the potential of social networking in enhancing teaching and learning.

Within this context, data indicate that the tool NING™ was able to afford preservice teacher engagement with content and online interactions that supported and extended learning. However, this conclusion presupposes they had adequate access to the Internet. Our findings indicated that even in today's technological society Internet access and speed are still significant issues for some communities.

Preservice teachers reporting access issues were located in city, rural, regional, and remote areas and are an ongoing consideration as we become increasingly reliant on technology for teaching and learning. In an Australian or international context where reliable Internet access can be problematic, this issue has implications for the use of any online learning tool, with specific implications for the use of multimodal services and video.

The social networking tool NING™ provided unique tools that were useful for preservice teachers' learning and pedagogical and content knowledge development. Preservice teachers reported that the integration of images and multimedia was beneficial, and it appeared to facilitate a nexus between theory and practice. Further, the potential to link to external sites easily through hyperlinks seemed beneficial, with preservice teachers utilizing this tool to make practical links between unit content and additional resources. Although these findings have clear implications for practice, a follow-up longitudinal study would be required to ascertain whether the perceived impact might have a positive effect on knowledge acquisition in practice.

The results indicate that preservice teachers' capacity to personalize their pages was useful in facilitating the development of a learning community. Enabling preservice teachers to identify with each other on a personal level helped break down the barriers between on campus and online students. The similarity to commonly used social networking tools such as Facebook also helped break down these barriers.

References

Abbitt, J. T. (2011). Measuring technological pedagogical content knowledge in preservice teacher education: A review of current methods and instruments. *Journal of Research Teacher Education, 43*(4), 281-300.

American Association of Colleges for Teacher Education and the Partnership for 21st Century Skills. (2010). *Education preparation: A vision for the 21st century (Draft 02.15.10).* Retrieved from http://aacte.org/pdf/News/featured_articles/Educator%20 Preparation%20and%2021st%20Century%20Skills%20DRAFT%20021510.pdf

Bowers, J., & Kumar, P. (2015). Students' perceptions of teaching and social presence: A comparative analysis of face-to-face and online learning environments. *International Journal of Web-Based Learning and Teaching Technologies, 10*(1), 27-44.

English, R. M., & Duncan-Howell, J. A. (2008). Facebook© goes to college: Using social networking tools to support students undertaking teaching practicum. *Journal of Online Learning and Teaching*, *4*(4), 596-601.

Gavelek, J. R., & Raphael, T. E. (1996). Changing talk about text: New roles for teachers and students. *Language Arts, 73*(3), 182–192.

Herrington, J., Reeves, T. C., & Oliver, R. (2014). *Authentic learning environments* (pp. 401-412). New York, NY: Springer.

Hughes, J., Gonzales-Dholakia, G., Wen, Y., & Yoon, H. (2012). The iron grip of productivity software within teacher education. In D. Polly, C. Mims, & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 170-191). Hershey, PA: ICI Global.

Hughes, J., Ko, Y., Lim, M., & Liu, S. (2014). Preservice teachers' social networking use, concerns, and educational possibilities: Trends from 2008-2012. In M. Searson & M. Ochoa (Eds.), *Proceedings of Society for Information Technology & Teacher Education International Conference 2014* (pp. 1256-1261). Chesapeake, VA: Association for the Advancement of Computing in Education.

Jackson, T. (2012). Ways to mentor methods faculty integration of technologies in their courses. In D. Polly, C. Mims, & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 519-534). Hershey, PA: ICI Global.

Jaipal, K., & Figg, C. (2010). Unpacking the "Total PACKage": Emergent TPACK characteristics from a study of preservice teachers teaching with technology. *Journal of Technology and Teacher Education, 18*(3), 415-441.

Jimoyiannis, A. (2010). Designing and implementing an integrated technological pedagogical science knowledge framework for science teachers' professional development. *Computers & Education 55*(3)*,* 1259-1269.

Kay, R. (2006). Evaluating strategies used to incorporate technology into preservice education: A review of the literature. *Journal of Research on Technology in Education, 38*(4), 383-408.

Kimmons, R., & Veletsianos, G. (2014). The fragmented educator 2.0: Social networking sites, acceptable identity fragments, and the identity constellation. *Computers & Education*, *72*, 292-301.

Koehler, M. J., Mishra, P., Akcaoglu, M., & Rosenberg, J. (2013). The technological pedagogical content knowledge framework for teachers and teacher educators. In R. Thyagarajan (Ed.). *ICT integrated teacher education: A resource book* (pp. 2-7). New Delhi, India: CEMCA.

Kong, A., & Pearson, P. (2002). *The road to participation: The evolution of a literary community in the intermediate grade classroom of linguistically diverse learners (CIERA Report #3-017)*. Retrieved from the Center for the Improvement of Early Reading Achievement website: http://www.ciera.org/library/reports/inquiry-3/3-017/3-017p.pdf

Lim, C. P., Chai, C. S., & Churchill, D. (2010). *Leading ICT in education practices: A capacity building toolkit for teacher education institutions in the Asia-Pacific*. Singapore: Microsoft.

Lloyd, M. (2011). A tale of six fish: Achieving social presence through discussion forums in an offline learning environment. *Journal of Learning Design*, *4*(2), 39-51.

Lockyer, L., & Patterson, J. (2008). Integrating social networking technologies in education: A case study of a formal learning environment. In P. Diaz, Kinshuk, I. Aedo, & E. Mora (Eds.). *IEEE International Conference on Advanced Learning Technologies, Santander, Spain* (pp. 529-533). Los Alamitos, CA: IEEE Computer Society.

Madson, M., Melchert, T., & Whipp, J. (2004). Assessing student exposure to and use of computer technologies through an examination of course syllabi. *Assessment & Evaluation in Higher Education, 29*(5), 449-561.

McLoughlin, C., & Lee, M. J. W. (2008). Mapping the digital terrain: New media and social software as catalysts for pedagogical change. In *Hello! Where are you in the landscape of educational technology? Proceedings ascilite Melbourne 2008*. Retrieved from http://www.ascilite.org.au/conferences/melbourne08/procs/mcloughlin.pdf

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017-1054.

Mishra, P., Koehler, M., Zellner, A., & Kereluik, K., (2012), Thematic considerations in integrating TPACK in a graduate program. In D. Polly, C. Mims & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 1-12). Hershey, PA: ICI Global.

Norton, P., & Hathaway, D. (2012). Lessons from the ITS Program: Five design strategies on which to build technology-rich teacher education. In D. Polly, C. Mims, & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 13-27).Hershey, PA: ICI Global

Ottenbriet-Leftwhich, A. (2012). The importance of using subject-specific technology uses to teach TPACK: A case study. In D. Polly, C. Mims, & K. Persichitte (Eds.), *Developing technology-rich teacher education programs: Key issues* (pp. 152–169). Hershey, PA: ICI Global.

Prensky, M. (2006). *Don't bother me, Mom—I'm learning*! St Paul, MN: Paragon House Publishers.

Quong, J., & Snider, S. (2012). To Ning or not to Ning: The benefits of social networking in teacher education programs. In P. Resta (Ed.),*Proceedings of Society for Information Technology & Teacher Education International Conference 2012* (pp. 791-795). Chesapeake, VA: Association for the Advancement of Computers in Education.

Rotherham, A., & Willingham, D. (2009). 21st century learning skills – the challenges ahead. *Educational Leadership, 67*(1), 16-21.

Ryan, M., & Lloyd, M. (2003, November). *Online, off-line, teaching in between the lines*. Paper presented at the OLT 2003 Conference, Brisbane, Australia. Retrieved from http://eprints.qut.edu.au/71

Selwyn, N. (2007, October). *Web 2.0 applications as alternative environments for informal learning - a critical review.* Background paper prepared for the CERI-KERIS International Expert Meeting on ICT and Educational Performance. Cheju National University, South Korea.

Tinto, V. (2000). Learning better together: The impact of learning communities on student success in higher education. *Journal of Institutional Research*, *9*(1), 48–53.

Vygotsky, L. S. (1978). *Mind in society.* Cambridge, MA: Harvard University Press.

Author Notes

Kate Highfield
Macquarie University
AUSTRALIA
Email: kate.highfield@mq.edu.au

Marina Papic
Macquarie University
AUSTRALIA
Email: marina.papic@mq.edu.au