



The Internet as a resource and support network for diverse geoscientists

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Many geologists think mentoring is provided by colleagues sharing a hallway, networking happens over beer at GSA, and learning about new research occurs when reading a journal or attending a conference. For a small but growing group of geoscientists, mentoring, networking, and learning about exciting new research are activities that can take place at any time of day and involve interacting with people all around the world. Imagine a mini-GSA meeting happening at all times. These geoscientists are taking advantage of the interactions and knowledge-sharing afforded by the Internet, through blogs, Twitter, and similar user-generated social media outlets. There are at least 250 geo-blogs and almost 300 people tweeting about geoscience topics (see lists at <http://geoblogs.stratigraphy.net/?action=list> and <http://twitter.com/theAGU/geo-space-ocean-scientist>).

Women and minority geoscientists are taking an active part in building this online community without geographic constraints. At least 35 women geoscientists regularly or occasionally blog about geoscience topics, and more than 150 women bloggers write about their lives as scientists and their scientific interests (e.g., *Scientiae Carnival*, <http://scientiae-carnival.blogspot.com/>). The number of women geoscientists who read blogs, but do not write them, may be much higher. At least 112 women geoscientists are using Twitter to discuss a wide variety of geosciences topics (<http://hydrogeo.wordpress.com/2010/06/27/women-geo-types-on-twitter/>).

The online opportunities for mentoring, networking, and knowledge sharing may be particularly valuable for women and minority geoscientists. Virtual networks offer opportunities to provide support and reduce the professional isolation that can be felt in physical work environments where there are few colleagues of a similar gender, race, or ethnicity. Although women now receive almost half (40%–45%) of the undergraduate degrees in geosciences, the proportion of women in tenure-track academic positions is only 14% (Martinez, 2008). The situation for underrepresented minorities is

much worse, with just 5%–6% of degrees at any level going to minority students. Indeed, the geosciences are the least ethnically diverse of the science and engineering disciplines (Huntoon and Lane, 2007).

As the numbers of bloggers and Twitter users indicate, women geoscientists are using social networking, but we wanted to know what benefits these users saw from their online activities. In an anonymous online survey conducted during August and September 2009, we assessed the experiences of women geoscientists who read and write blogs. The survey asked about (1) reading and blogging habits; (2) blogs the respondents read; (3) why participants read blogs; (4) what benefits the participants gained from reading blogs; and (5) the experience of blogging. The survey received 102 responses; 89% (91) of respondents were women, and 92% (94) were white. Because of the small number of men respondents and concerns about the representativeness of the men responding, we chose to look at the results for women only. The small number of non-white respondents made it impossible to break out the results by race or ethnicity. Therefore, while the results we report are from all women respondents, they primarily reflect the experiences of white women.

Students (31% [28]) and faculty (26% [24]) dominated the responses, though there were also a number of people working in industry (16% [15]), government (12% [11]), and other categories. Respondents included bloggers (41% [37]) and non-bloggers (59% [52]). The women geoscientists write about a variety of topics; 27% (10) blog under their real-life name, 59% (22) write under pen names (pseudonyms), and 14% (5) write anonymously. More than 90% of blog readers reported reading blogs about geology and other sciences, as well as blogs about the lives of women in science and various non-science topics.

Women reported professional and social benefits from reading blogs. We used a five-point scale (1: strongly agree; 3: neutral; 5: strongly disagree) to assess perceived benefits. Of the professional benefits, respondents were most positive about learning things outside their specialty (avg. 1.9), followed by learning within their specialty (avg. 2.3), learning about pedagogy (avg. 2.4), and learning about technology (avg. 2.5). Based on these responses, we conclude that these women blog readers perceive positive professional benefits from their online reading. This suggests that social and other online media could be strategically used to supplement the resources available to all geoscientists, regardless of their gender, ethnicity, geographic location, or employment status.

Of the social benefits of reading blogs, women were equally positive about the benefits for finding a greater variety of role models than in their off-line life, making their own experiences seem more normal, feeling connected to women scientists, and providing information and perspective on the lives of women scientists (avg. 2.2). These four statements were highly correlated ($r = 0.56$ to 0.64); women who responded positively (or negatively) to one statement tended to respond positively (or negatively) to the other statements in that group. Respondents were somewhat positive about the utility of blogs for telling them about what work as a geoscientist is like (avg. 2.4), feeling connected within their field (avg. 2.4), and participating in gender discussions (2.6). These results suggest that social media, such as blogs, provide a benefit to women geoscientists by giving them an outlet to counter the isolation they might be experiencing in their educational or work environments and contributing to a normalization of their experiences.

When the survey responses are divided into students, faculty, industry-based geoscientists, and government geoscientists, differences in the apparent social benefits of blog reading are striking (Fig. 1). Geoscience students perceived the strongest benefits from blog reading, while faculty most strongly agreed that blogs helped them find role models and normalize their experience by finding that many other faculty share their experiences and perspectives. Women in industry perceived less social benefit from blog reading than those in academia, but women in government were the most negative about their blog-reading experiences. In particular, their responses indicated that blog reading had not been helpful to them in finding role models.

There are at least two possible explanations for the differences in perceived benefits of blog reading between academic and non-academic geoscientists. One reason for the disparity could be that academia may be a less supportive environment for women than industry and government, leading academic women to find greater benefits from online interactions and mentoring. The National Academies' report, "Beyond Bias and Barriers" (Committee on Maximizing the Potential of Women in Academic Science and Engineering, 2006), cited a number of ways that academic science and engineering puts women at a disadvantage and ways that the climate for women scientists could be improved. A second, not mutually exclusive, possible explanation for the differences in experiences between academic and non-academic women in our data set is that academic women are represented in greater numbers in terms of both survey response and blog authorship. There were twice as many academic women respondents as there were from industry and government. Of the women geoscientists who wrote blogs at the time of our survey, there were 11 faculty, six students, six women in industry, and five women in government. In addition, there are many academic women-in-science blogs written by women in other fields. Women in industry or government may not see their experiences represented amongst all the academics writing blogs. There may be too few non-academic women writing blogs for industry and government women to find social support networks online. Such

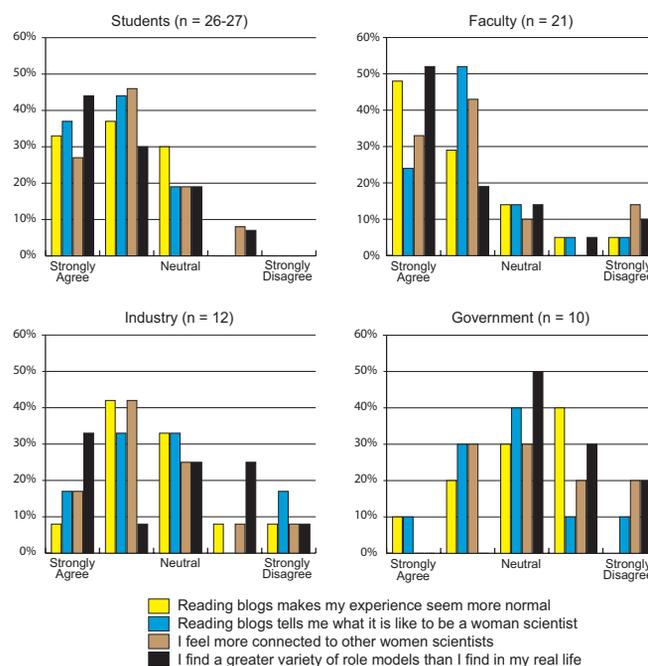


Figure 1. Perceived benefits of reading blogs by women geoscientists in different employment sectors.

low numbers may be due to official policies or unofficial workplace climates that prohibit or discourage blogging.

The lack of support through social media is likely to be experienced more acutely by minority geoscientists, particularly minority women. If women in government don't see their experiences reflected, what about African-American, Latina, American Indian, or Asian-American women geoscientists who are reading blogs or following Twitter? The role of social media in supporting international geoscientists is also unknown. The new and rapidly developing social media networks may not be able to counter isolation or provide support for minority geoscientists unless there is a critical mass of diverse voices writing blogs and providing Twitter updates that reflect and normalize the experience of the non-white, female, and non-academic geoscience communities. Such a critical mass is much more likely to occur if, more than just being accepted or even welcomed, diverse voices are actively sought out and supported by leaders in the geosciences.

Blogs and other social media may provide a source of community and role models for women geoscientists and help in the recruitment and retention of women from undergraduate education to faculty or industry careers. Our survey results show that blogs are already providing valuable benefits to white, academic women geoscientists, but that existing social media networks could be doing a better job of supporting minority geoscientists and those outside academia. We believe that professional societies, employers, funding agencies, and individual geoscientists should recognize the potential value of social media for supporting a diverse geoscience community. To be effective, such recognition should be accompanied by policies that encourage geoscientists to actively participate in geoscience-related social media opportunities.

Time spent online could be considered an integral part of continuing professional development and networking, a vital complement to the face-to-face opportunities offered at professional meetings like GSA's Annual and Section Meetings.

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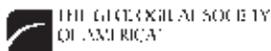
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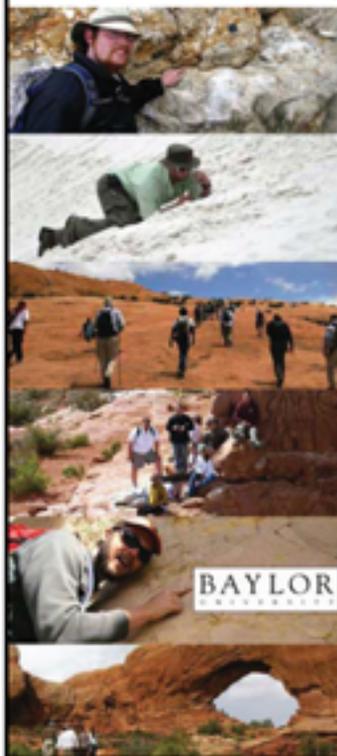
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