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Technology Transfer: From Society to the Lab and Classroom

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Sunday morning at 8 am might not seem like the best bet to find an interesting session at an American Chemical Society (ACS) meeting, but at the Chemical Information (CINF) Division program in Atlanta, this turned out to be the case. Every year or so, the CINFers present what amounts to a technology review, and this one, organized by Andrea Twiss-Brooks of the University of Chicago and Erja Kajosalo from MIT, was exciting on a number of counts. There were a total of eight speakers in the symposium on Social Software and Chemical Information, covering topics from social software, Web 2.0, classroom/educational applications, open access, Wikipedia, blogs, and webinars. It would be impossible to highlight all of the topics covered, so I will only attempt to give a few highlights. If you wish, you can skip my comments altogether, and jump to the last paragraph for the *coup de grâce*.

The most interesting impression to me is that so much is happening; it is difficult to keep abreast of everything. The other impression I got is that while we usually think of technology being transferred from the laboratory to society, this technology is doing just the opposite, moving from society-at-large to the scientific and professional worlds.

The first talk presented a laundry list of new technologies that together comprise what is coming to be known as social software. The speaker, Beth Thomsett-Scott from the University of North Texas, polled the audience to determine how many were familiar with each technology she mentioned. Nearly all had heard of the initial topics she discussed, such as RSS, Wiki, and Flickr. However, by her last slides, only two or three raised their hands. Things like jybe (join your browser with everyone), furl (frame uniform resource locator), and clicker (a wireless device that could be used for students to respond to questions from a teacher) had not yet reached the attention of most in the audience. These are interesting technologies to examine, but the question with all of these tools is how many will actually make it into the mainstream.

Teri Vogel of UCSD gave an overview of RSS as a unifying example of Web 2.0 *(If you don't yet know what Web 2.0 is, don't worry, it's not that well defined. Check Wikipedia for the current definition.)* Vogel quotes a figure of 5–10% of Internet users currently utilizing RSS. If you are not one of those, this talk included a short tutorial on how to use RSS. Please see the last paragraph for more information. Vogel also included many examples of web sites, including libraries, publishers, and government organizations that are using RSS. She stated a couple of times that one could use RSS to poll many different sites and then read the feeds at your leisure. One wonders if, after keeping track of new emerging technologies, learning how to use new technologies, and then connecting to a host of RSS feeds, there will ever be leisure time to read the content of the feeds *(Note: if you don't know what RSS is, there seems to be an ever-growing list of meanings for the acronym. Perhaps an RSS feed of new RSS meanings of RSS would help.)*

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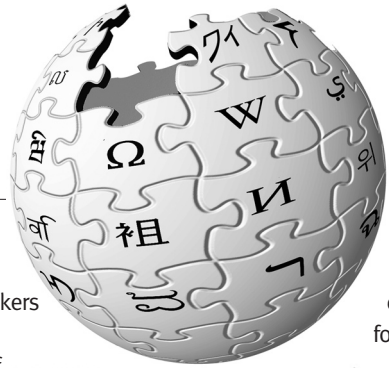

WIKIPEDIA
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Two of the other speakers discussed technology to make audio recording of classes and/or meetings for later use by the students or others who might have missed the class or presentation or might wish to review some of the material covered. Brian Lynch, of St. Francis Xavier University, pointed out that in Australia it is standard practice to record every lecture and post them on the Internet within an hour. Jeremy Garritano described the application of audio recording technology into classrooms in Purdue. While the technology is fairly straightforward, difficulties were encountered in scalability, location of microphones to capture the lecturer (but not background noise), and delivery of the audio files in an easily usable fashion.

Blogging was the subject of two talks as well. Barbara Greenman of University of Colorado Boulder and Randy Reichardt of the University of Alberta, talked about how blogging is changing the way classes are run, changing the way students collaborate, and could potentially change the scientific publication process as well.

Wikipedia has emerged as a common tool that many use regularly for at least an initial attempt to find information about a new subject. In fact, several of the morning's speakers used Wikipedia as a reference to define the new terms about which they were speaking. Concerns over this resource as a reliable source for information were captured in the title of the talk by Martin Walker of SUNY Potsdam, "Wikipedia: Social revolution or information disaster?" As might be expected from one of the 29 editors of the Wikipedia chemistry project, Walker's answer was on the side of the revolution. He acknowledged the potential for problems. For example, anybody can edit a Wikipedia entry and entries don't undergo a formal peer review. He even gave examples that have been seen on the chemistry portal: an entry for barium chloride had invalid data on solubility, reactivity, and toxicity for six weeks; an entry was made for a fictitious molecule. However, these instances are rare. Some types of vandalism can be detected automatically by Wikipedia. With alerting tools in place, the portal editors are quickly notified of any changes, legitimate changes, changes introduced by well-intentioned but uninformed individuals as well as those introduced by malicious miscreants. This allows errors to be discovered relatively quickly and repaired. Quoting from a *Nature* study (http://dx.doi.org/10.1038/438900a), Walker concluded that Wikipedia is right most of the time and represents a real success of the Open Access movement. He noted that none of the other speakers referenced *Encyclopedia Britannica* for their definitions, since they aren't available there. It will be interesting to see how the level of effort in the growth and maintenance of Wikipedia will continue over time. For now, the result is impressive.

The last talk in the morning session was presented via WebEx. The speaker, Jonathan Coffman from Wyeth Pharma, did not make the trip to Atlanta but presented his talk via speakerphone and Internet. The slides were controlled by Coffman in New Hampshire, viewed on a laptop in the meeting room, and projected onto the screen. The speakerphone, situated next to the microphone, provided the audio. Coffman's topic was how the ACS Biotechnology Secretariat has used WebEx technology to hold a number of remote symposia, and he discussed the potential benefits of the technology if it were to be more widely adopted for use in ACS National and Regional Meetings. BIOT's use of remote symposia was focused mainly on how to maintain membership in the BIOT Secretariat, as well as to reach out to a larger number of scientists than were able to attend the symposia in person. The talk went off without a hitch, and there was not really any hindrance to the exchange of information by Coffman's presence virtually. Even the question and answer part of the talk was not too much different from normal. I don't know how much of the questions from the audience Coffman could hear, but as is usual, the session chair repeated the question, and she was seated next to the speaker phone.

I will briefly mention the afternoon session on scholarly publishing, since besides my involvement as a co-organizer, there is a tie-in with the theme of the morning session. George Whitesides opened the session on The Nuts and Bolts of Scholarly Publishing with a very nuts and bolts talk on authoring a paper. With over 900 publications to his credit, he is certainly qualified to address the subject. He advocated a very methodical approach to writing an article for publication, encouraging those present to consider the process of writing to be an integral part of the research process itself. Whitesides simply stated that if you don't publish your research, what is the point of having done it?

The following talks dealt with the peer review process, ethical questions, and the process of turning the author's material into published articles. These may be thought of as fairly mundane topics, but given the recent examples of fraudulent publications, they should, perhaps, be given greater consideration. As was emphasized in each of the talks, the sheer volume of manuscripts submitted for publication place ever increasing burdens on the entire system. If the increasing pressure for publishing, along with advanced tools capable of manipulating graphics and generating high volumes of reasonable looking data, results in an increase in the number of scientists willing to cut corners, the entire enterprise is at risk. Journal editors may one day use technology to help them spot the most

blatant forms of fraud. These talks, as well as similar presentations at other venues, indicate that journal editors and publishers are starting to look for ways to get the word out that ethics is something to be considered in training scientists for their careers.

The last talk in the afternoon was given by *ACS Chemical Biology*'s (*ACS CB*) own Sarah Tegen and Evelyn Jabri. Their topic was the way in which the World Wide Web is being exploited in the publishing world, with examples from *ACS CB* as well as from other journals. This presentation showed how some of the examples discussed in the morning session are beginning to appear in one way or another in a variety of publications. Through examples from *Amazon*, *Science*, *Nature*, and *ACS CB*, features to find related information, evaluate content, and organize content were demonstrated. Interactive features were also demonstrated, although this is probably the last area to be incorporated routinely within the scientific publishing community.

In the spirit of "practicing what you preach", the entire symposium was recorded, using iPod technology, and the recordings, along with PowerPoint and PDF files of the presentations, have been posted on the CINF web site, under the "Technical Session" link for Atlanta at "Meetings" at http://www.acscinf.org. Brian Lynch was responsible for the recording and described the procedure during his talk. So you don't need to take my word for it, you can listen for yourself. The last speaker in the session illustrated of the power of the technology. As already mentioned, the speaker himself was not present in person. Yet the WebEx mechanism which brought his presentation, live, to the audience was recorded in the same manner, and there are no essential differences between his presentation and those of the other speakers. To highlight the data from both Lynch and Coffman, the posting of these presentations makes the session available to the 95% of ACS members who didn't make it to the meeting or those who were attending one of the other 66 sessions occurring at the same time. Whether this really substitutes for attendance at a meeting, with the opportunity for face-to-face networking at receptions, meals, even informal hallway conversations, can be debated. What can't be debated, though, is that technology is making an impact on the way we interact with each other, and this impact is felt in our scientific interaction as well. Many of the technologies discussed in this session have exploded in the culture at large but have yet to gain wide acceptance in our professional world. To echo the words of Andrea Twiss-Brooks in her opening comments, the next generation, the "digital natives", could already

Image courtesy of Getty Images.

be using technologies which haven't even made it onto our radar. Many organizations, including universities, libraries, societies, and publishers, are experimenting with emerging technologies, not knowing which will capture the mind of the scientific user. The challenge for any organization is whether to jump in on the leading, and experimental, edge, knowing that some experiments will fail, or to join in later, once a technology has been proven, and play "catch-up". Whatever decision one makes, there are risks. The one thing we can say is that whatever the future brings, someone will have predicted it. We just don't know who. So stay tuned.