An Online and Social Media Training Curricula to Facilitate Bench-to-Bedside Information Transfer

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ABSTRACT

OBJECTIVES: Translational research focuses on the bench-to-bedside information transfer process — getting the information from researchers into the hands of clinical decision makers. At the same time, researchers who manage international research collaborations could benefit from increased knowledge and awareness of online collaboration tools to support these projects. Our goal was to support both needs through building awareness and skills with online and social media.

METHODS: The Library developed a curricula targeted specifically to academic researchers focusing on collaboration technologies and online tools to support the research process. The curricula will provide instruction at three levels: gateway, bridge, and mastery tools. The goal of Level One is to persuade researchers of the utility of online social tools. To develop the program, input was solicited from researchers identified as leaders in this area as well as focus groups of students to discover which tools are already being used.

RESULTS: Training is being provided on those tools identified as most likely to engage researchers (Google Docs, Skype, online scheduling, Adobe Connect, citation sharing tools). The curricula is being delivered as workshops duplicated as podcasts and in other online media.

CONCLUSIONS: Online and social media are practical tools for supporting distance collaborations relatively inexpensively while offering the added benefit of placing selected information in online spaces that facilitate discovery and discussion with clinical care providers, thus supporting the fundamental research processes at the same time as promoting bench-to-bedside information transfer.

Background

Translational research focuses on the bench-to-bedside information transfer process — getting the information from researchers into the hands of clinical decision makers. At the same time, researchers who manage international research collaborations could benefit from increased knowledge and awareness of online collaboration tools to support these projects. The goal of this project was to facilitate adoption of tools to diversify communication, promoting the use of these in the dissemination of research findings, applying social media and technologies to critical research with the goal of promoting adoption of the new interventions by frontline clinicians and healthcare consumers.

Science 2.0 / Open Science

Science 2.0 is often associated with the Open Science movement as if they are the same thing. Indeed, some definitions of Science 2.0 focus solely on scientists collaborating with other scientists, while others more broadly incorporate applications of social media and technologies across the entire range of science and research endeavors. The latter concept focuses on the overlapping space of Web 2.0 and science, requiring that we first accept a definition of Web 2.0.

“Web 2.0” is an umbrella term that is used to refer to a new era of Web-enabled applications that are built around user-generated or user-manipulated content, such as wikis, blogs, podcasts, and social networking sites.
Examples of user-generated and manipulated content in science range from open notebook science\(^1\)\(^5\) and social networks for researchers or lab groups\(^6\) to crowdsourcing (also known as volunteer or citizen science)\(^7\), clinical trial subject recruitment\(^8\), and research findings dissemination and adoption\(^9\). It is the latter that most concerns us, and which has had the least overt development. For the purpose of this paper, we are defining Science 2.0 in that broad sense of social media and technologies colloquially referred to as Web 2.0 as applied in any fashion to the activities and processes of research or the professional lives, communities and communications of scientists.

The importance of social media in research science should not be limited solely to its use to connect scientists with other scientists, or to connect science with the broader public, but is also of interest to researchers as an area of enquiry in itself. This becomes evident when looking at its presence in the medical literature. A thorough search of social media in Pubmed [Figure 1] shows that articles about social media in the biomedical and life sciences literature have been doubling annually for the past three years [Figure 2].

**Figure 1: Pubmed Search, Social Media**

("second life" AND (virtual OR 3d OR immersive)) OR "virtual worlds" OR "web 3.0" OR "medicine 2.0" OR "health 2.0" OR "web 2.0" OR mashup OR "social media" OR digg OR "del.icio.us" OR "social bookmarking" OR wikis OR folksonomy OR wikipedia OR flickr OR twitter OR youtube OR facebook OR myspace

**Figure 2: Social Media Articles in Pubmed by Year**
Further analysis shows that the social media topics of greatest interest as research areas [Figure 3] are:

1. Web 2.0 (broadly, as a category)
2. Virtual worlds
3. Wikis in general, and Wikipedia in particular
4. MySpace
5. YouTube

Despite the interesting trends shown here, the broad diversity of topics and concepts being studied as well as the lack of a definitive controlled vocabulary or ontology to define the field show that this interest is still at a nascent or fledgling stage.

While this data shows a growing importance of the domain as a topic and area of enquiry, there is substantial anecdotal evidence to show that while scientists may study social media, there is a general reluctance to engage in the use of it personally, and that this lack of engagement with
current information and social technology trends is impacting on the professions in ways that handicap their current and future effectiveness. Berners-Lee et al expressed concern about researchers' lack of engagement with new online communities.

Researchers grow ever more dependent on the Web; but they have no coherent agenda for exploring the emerging trends on the Web, nor are they fully engaged with the emerging Web research community to more specifically focus on providing for scientists' needs.\textsuperscript{10}

Cope and Kalantzis recently predicted new models of scholarly publication that depend heavily on new media and social technologies, implying the necessity of engaging with these trends and technologies as part of the scholarly process in order to achieve professional success.

Whatever the models that emerge, the knowledge systems of the near future could and should be very different from those of our recent past. The sites of formal knowledge validation and documentation will be more dispersed across varied social sites. They will be more global. The knowledge processes they use will be more reflexive and so more thorough and reliable. Knowledge will be made available faster. Through semantic publishing, knowledge will be more discoverable and open to disaggregation, reaggregation and reinterpretation. There will be much more of it, but it will be much easier to navigate. The internet provides us these affordances. It will allow us to define and apply new epistemic virtues. It is our task as knowledge workers to realize the promise of our times and to create more responsive, equitable and powerful knowledge ecologies.\textsuperscript{11}

More colloquially, Patil and Siegel expressed a fundamental assumption that "scientists are laughably anachronistic in their approach to information." Later in the same article they express the concern that failure to adapt to and adopt these new trends could have serious ramifications for the scientific research community.

The fundamental question is this: can the wisdom of crowds be exploited to post-filter the literature? If not, is the barrier at the level of the product, or the end-users, or both? Is there something qualitatively different about academic papers, or academicians themselves, that would make it impossible to adapt the ways we have come to signify and communicate the quality of commercial products? Finally: if we scientists fail to adapt, and to efficiently use the tools that have become available, what will it mean for the future of science communication?\textsuperscript{12}

Reasons for this lack of engagement with social media by scientists is just beginning to be studied, but so far shows many of the same concerns, risks and benefits as those found in research with other populations\textsuperscript{13}. Nature Publishing Groups in collaboration with the British Library held an event to examine these issues on September 24, 2008. Timo Hannay, publishing director for Nature.com provided a provocative introductory talk, which was followed by over an hour of passionate discussion by leading Science 2.0 and Open Science advocates and opponents, enriched by observations from the partnered event held in Second Life\textsuperscript{14}.

The top three barriers to adoption discussed prominently in this event were:

1. perceived lack of utility;
2. intellectual property control;
3. identity and image control.

Of these, the perceived lack of utility is considered to be the most significant.
Institutional Background and Positioning

The University of Michigan Health Sciences Libraries (HSL) identified a need in our community to address these barriers. This came about in large part because the University of Michigan had defined an institutional priority to move toward open access informational and educational resources. This shift toward open access and open source resources had been adopted for many reasons, including economics, marketing, and positioning the institution for future growth. Transparency in content creation and provision had been identified as pivotal to achieving the desired outcomes. Critical to the success of this shift toward a more transparent institution is adoption by the community. Most important among the community would be faculty and researchers as primary content creators. Also contributing to this focus is the National Institutes of Health (NIH) Public Access Policy requiring open access to NIH grant-funded research. With the University of Michigan Medical School (UMMS) as leading in NIH grant funding in the university and ranked 7th nationally for NIH funding, these also serve as strong motivators.

HSL was well positioned to take ownership and leadership in promoting adoption of open access, open source, and social media. The Library supports the Medical School and serves as consultant on open access issues with NIH grantsmanship; partners with the UMMS Department of Enabling Technologies on social media and virtual worlds initiatives; partners in specific grant funded projects and has for several years offered workshops, lectures and for-credit courses on social media information management and content creation tools throughout the five health schools and programs as well as across campus. In addition, HSL has a position identified as Emerging Technologies Librarian specifically to address this area, as well as a grantsmanship expert, and a generally high level of awareness of social media tools throughout the broader health sciences library staff. Prior connections to research and clinical faculty exist through the liaisons program, and the library has many prior technology partnerships among the six health sciences schools and programs (dentistry, kinesiology, nursing, medicine, pharmacy, and public health).

Methods

One prior partnership, with the School of Dentistry, was an informal lunch time lecture series ("Bootcamps") focused on technology with individual lectures archived as podcasts as well as in iTunesU, making it an appropriate venue for dissemination. Since the purpose of the proposed series was not simply to educate but to promote adoption and overcome potential resistance, the more important hurdle was to identify what tools and skills would be most likely to be helpful and interesting to research faculty. To discover this and achieve consensus, we took a five-pronged approach.

1. Reviews of external sources such as the published literature and relevant online media and community discussions
2. Discussions with liaison librarians assigned to research teams
3. Calls for future topics provided to our School of Dentistry Bootcamp coordinator
4. Findings from focus groups with students and faculty
5. Findings from interviews with local "opinion leaders" in research and social media

Reviews of external sources included articles and contact with or examples from the online Science 2.0 community.

Liaison librarians were positioned in research units, such as the National Center for Integrative Biomedical Informatics. Discussions with liaison librarians confirmed that findings from studies of other groups seemed to hold true here as well, with most of the faculty not using many of the "Web
2.0” applications. They were able to identify areas of need, specifically highlighting online scheduling, Skype and Google Docs.

The School of Dentistry Bootcamp coordinator directed requests from his community to our attention. The general tenor of requests was to focus on specific tools with immediate utility and practicality, with specific requests for EndNote, advanced editing in Microsoft Word, Skype and Google Docs. Of the requested topics, two were out of scope for this project.

Mixed student/faculty focus groups were held under the oversight of the School of Medicine in two sections. The focus groups typically consisted of two faculty and 4-6 students. Library staff participated in the role of an observer. The Medical School shared transcripts of the conversations with the Library, to which textual analysis was applied. Technology learning tools mentioned most frequently by these groups included Google (Google Docs), wiki, Facebook, Groupwise, Powerpoint, email, video, phones, CTools, and YouTube. Of these, Groupwise and CTools are both local systems, while the rest include a mix of technologies, most of which are public or otherwise under the control of the student rather than the institution. In the discussion, the students stated their strongest preference to be for use of Google Docs, which was used both for creating and collaboration for the student-controlled wiki as well as student presentations. The intensity of student engagement with social media tools exhibited in these discussions served to trigger faculty interest among the participants.

Figure 3: Prominent Terms in Focus Group Discussions

The local opinion leaders were two faculty members in the local health system researching the adoption and use of social media by specific communities within faculty peer groups. Their input was more detailed and comprehensive than those with the other groups, and was the most influential. They sought to be active partners in the curriculum planning, but relied on the libraries expertise in instruction for the presentation of planned content. For the curriculum planning process, they shared findings from their various research projects related to what research scientists and faculty actually use in the way of social media, the observed barriers to adoption, where they place their time and money that could be possibly served more efficiently through the
use of online collaboration tools. A very specific barrier they noted to adoption of online writing collaboration tools is the lack of integration of citation management features within these tools or the ability to import/export to standard applications such as EndNote.

It was in these discussions that the concepts evolved of stratifying the topics to be presented according to gateway, bridge and mastery tools. Gateway tools are those that provide the maximum utility for the least effort and have the most immediate relevance to the target audience. Bridge tools would build upon that foundation, expanding into a core set of competencies for the general universe of online social and collaboration tools. Mastery tools would go past basic competencies to include specialty and niche tools, communities and resources for specific research and professional collaboration functions, including managing specific tasks related to the research production process and the true Science 2.0 and Open Notebook Science tools.

**Curriculum Plan**

Each presentation clearly articulated the connection between the tool and the life of the researcher through examples and/or case studies. These examples were selected from personal experience, solicited from liaison librarians and our local opinion leaders, and chosen from examples provided by researchers at other institutions who are active advocates of Science 2.0 and Open Notebook Science. Examples in the latter category were primarily sought through the FriendFeed Science 2.0 room. Target audience included life science researchers, lab staff, and those who support their work.

The curriculum plan divided topics into a three-step structure: gateway, bridge, and mastery tools. The focus of Phase One was on demonstrating utility of the tools to promote adoption of online collaboration productivity tools as a gateway to adoption of social in general. Phase Two, bridge tools, built on the skills from Phase One by offering training on more advanced features and skills of the gateway tools in addition to offering new tools that expand on the general social media theme. Phase Three, mastery tools, focused on tools developed explicitly for the science and research communities as well as niche tools, for special communities or special tasks. Because of the rapidly changing nature of these tools, adding new features and functions over time, educational offerings in each area will be revised and repeated, creating a cycle of learning that is intended to build community, foster ongoing relationships, and support the research community and processes over time.

*Figure 4: Cycle of Learning*
Phase One: Gateway Tools

Step One:

Introductory and overview sessions were presented face to face to a select audience during Enriching Scholarship, which is an annual campus wide week-long festival of current awareness and skills-building workshops for faculty on educational technologies.

Introductory Overview Session
Science 2.0: Social and Emerging Technologies for Life Science and Biomedical Researchers, Part 1
Increasingly online tools, resources and services are being developed to support both community building and data sharing among researchers, as well as environments to engage with clinicians and end users (health care consumers). These tools and social environments have potential impact for science collaboration as well as translational efforts, facilitation adoption, and technology transfer of new innovative technology and new discoveries. This session will overview the current status of available tools, who is using them, who isn't, and how they are being used, as well as suggesting possible future applications of these tools.

Gateway Tools session
Science 2.0: Social and Emerging Technologies for Life Science and Biomedical Researchers, Part 2
This two hour session will briefly demonstrate a selection of the most useful online collaboration tools for scientists, researchers, managers, and academics. Types of tools focus on general collaboration, communication, and productivity tools selected to match common academic and research tasks and functions. Selected tools include: Skype, Online Scheduling, Google Docs, Slideshare / Zoho Show (online presentation tools), Adobe Connect, and Mendeley.

Step Two:

More detailed face-to-face presentations were given on the specific gateway tools selected as part of the Bootcamp series. These presentations were hosted and recorded in partnership with the School of Dentistry.

- April 15 - Google Docs
- April 22 - Skype
- May 13 - Online Scheduling Tools
- June 10 - Online Citation Management: Mendeley & WizFolio
- June 17 - Online Presentation Tools for Researchers: Focus on Slideshare and Zoho Show
- June 24 - Introduction to Adobe Connect and DimDim

The protocol for creating the presentations followed this format.

- Time: 30 minutes of presentation, 10 minutes discussion and life examples
- Format: All presenters used slides for the formal portion of the presentation
- Tech: Audio and video were captured with the Podcast Producer software
- Content: Screenshots, images, and other visuals were used heavily to illustrate the examples. All presentations had some institutional branding on the slides, the contact information for the presenter, and included explicit examples connecting the content to use
in a research process or environment.

**Step Three:**

Archiving and dissemination of the information previously presented also occurred through social media tools. The Bootcamp series were recorded as podcasts (MP4 format), promoted through the School's website, email, and archived in iTunes as well as the institutional Open Educational Resources online repository. Discussions are underway to include them in a branded institutional YouTube channel. All of the Bootcamp presentations utilized slideshows, with the slide presentations being archived in Slideshare. Audio was spliced out of the video with the resulting MP3 files synced with the Slideshare presentations to create embeddable Flash versions of the presentations. These were then available to be repurposed through such uses as placement in blogposts as well as on our library homepage.

**Step Four:**

While the above are happening, enrichment information, further details and new related topics will be posted to both the library and emerging technologies blogs.

**Step Five:**

Feedback and assessment is integrated throughout the process, with a final brief questionnaire sent to all participants. Following the initial offering of any specific presentation, the sessions will be offered as options for open classes on our regular schedule as well as customizable classes for specific audiences or populations upon request. All assessment data will be integrated into the planning for subsequent phases (bridge and mastery tools).

**Phase Two: Bridge Tools**

The plan for immediate implementation was to focus firstly on the gateway tools. Bridge and mastery tools are being tracked and a curriculum drafted, with the assumption that these will need revision at the time. Final selection will ideally derive from audience interest and requests, and will be collaboratively designed using the tools promoted in the gateway sessions. Tentative bridge tools proposed include these examples.

- Advanced Google Docs applications
- Blogs
- Bookmarking & library building/sharing (Connotea, 2collab, etc.)
- Brainstorming / mindmapping / concept generation and visualization tools
- Data visualization tools such as ManyEyes
- Dyadic and group online private chat tools
- Media sharing tools for promoting results and findings (blogs, Flickr, YouTube, Slideshare, open access journals, prepress archives)
- Online project management tools (Smartsheet, Huddle)
- Surveying tools
- Video chat tools
- Wikis (eg. WikiPathways, EcoliWiki)
Phase Three: Mastery Tools

The final phase will have a bidirectional focus on (1) tools and resources explicitly developed for scientists and researchers, and (2) tools and strategies to aid in staying current with new tools as well as discovering tools for a specific task or target community. Again, the final version of the curriculum will be developed in collaboration with the target community. Possible concepts and tools include the following.

- Data collection and crowdsourcing
- Data sharing and open notebook science tools
- Marketing (SciVee)
- Science task tools (MyExperiment, LabMeeting)
- Screencasting tools (Jing, Screencast)
- Semantic & microformat science applications (GoPubMed)
- Social networking (LinkedIn, Academia.edu, HUBzero, ScholarZ, ResearchGate)
- Twitter and microblogging tools (TrialX search for clinical trials, Qwitter tobacco cessation, Plurkshops)
- Virtual worlds and online collaboration spaces (Second Life, ExitReality, Wonderland)

Results

Online and social media are practical tools for supporting distance collaborations relatively inexpensively while offering the added benefit of placing selected information in online spaces that facilitate discovery and discussion with clinical care providers, thus supporting the fundamental research processes at the same time as promoting bench-to-bedside information transfer. A requirement for these tools functioning as described is the adoption and use of the tools by the research community.

Participation in the early sessions has been small, with face-to-face participants ranging from 3-20. Actual reach of the content is expected to grow as the sessions become available as podcasts and in other social media environments.

Reactions have included requests for sessions to be repeated, increased access to future sessions, expansion of the audience for sessions to include non-research communities, and informal monthly discussions and question/answer sessions to provide current awareness on new tools.

The information identified by participants as most useful and relevant to them was a case study of the use of social media used to facilitate new publication opportunities for graduate students and young researchers. Next most useful was iGoogle as a tool for aggregating and displaying RSS streams with science tools. This was interesting in particular because iGoogle was not a profiled technology but instead something that came up during free form question and answer sessions. As a result we are considering adding a free form discussion to our regular posted class and workshop offerings.

Footnotes


