



Wikipedia and academic peer review

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Wikipedia as a recognised medium for scholarly publication?

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Abstract

Purpose – The purpose of this paper is to engage in a thought experiment, exploring the use of Wikipedia or similar content-malleable systems for the review and dissemination of academic knowledge.

Design/methodology/approach – By looking at other sources, the paper considers the current state of the academic peer-review process, discusses Wikipedia and reflects on dynamic content creation and management applications currently in use in academia.

Findings – The traditional peer review process must be updated to match the rapid creation and diffusion of knowledge that characterises the 21st century. The Wikipedia concept is a potential model for more rapid and reliable dissemination of scholarly knowledge. The implications of such a concept would have a dramatic effect on the academic community.

Originality/value – This paper promotes a radical idea for changing the methods by which academic knowledge is both constructed and disseminated.

Keywords Peer review, Knowledge creation, Publications, Online operations

Paper type Research paper

Introduction

Imagine that we are designing a restaurant. This restaurant will serve steak. Because we are going to be serving steak, we will have steak knives for the customers. Because the customers will have steak knives, they might stab each other. Therefore, we conclude, we need to put each table into separate metal cages, to prevent the possibility of people stabbing each other...

I do not accept the spin that Wikipedia “allows anyone to write anything” just because we do not metaphysically prevent it by putting authors in cages (Jimmy Wales, board member and chairman emeritus, Wikimedia Foundation, 12 April 2006).

Knowledge is not produced solely in university settings; rather, production has many different venues, including government laboratories, industries and think-tanks (Gibbons *et al.*, 1994). Despite the variety in domains of knowledge production, peer-reviewed journals remain the standard for dissemination of information by individuals working in university environments. Stevan Harnad (1999) describes peer review as a quality control and certification process made necessary by the scale of knowledge being developed in today’s academic environment. Without a review process, discerning the reliability and validity of new work would become an arduous task. According to *Sense about Science* (2005, p. 6), “Peer review is an essential dividing



line for judging what is scientific and what is speculation and opinion". In 2004 there were approximately 20,000 peer-reviewed journals throughout the international academic community. Together these journals published 1.5 million articles annually (Kandziora, 2004).

Exploring peer review within traditional academic journals

The notion that an idea or concept could not be considered respectable until it had first appeared in a peer-reviewed journal did not become widespread until after the Second World War (Tipler, 2003). Postwar industrialism and advances in scientific knowledge induced scholars to conduct ever-increasing amounts of research; publishing was seen as the way to quantify the quality of a scholar. Universities began to realise that the professional and scholarly reputations of academics had a profound effect on the prestige of the employer. Coupled with the increased specialisation of academics within their chosen fields and amplified enrolment in post-secondary institutions, an environment was created for institutions where grants and publications began to play an increasingly substantial role in the determination of salary. As a result of the increased boom in production, the creation of scholarly articles has increased by more than a factor of a thousand during the past 50 years (Tipler, 2003).

In the traditional peer review process the scholar(s) wishing to publish a paper send a copy of the paper to the editor of a chosen journal. The editor makes a general decision as to whether a submission matches the criteria for a journal. Once a decision has been rendered based on these criteria, the paper is forwarded to reviewers whom the editor has deemed experts on the subject matter of the paper. The editor relies on the comments and opinions of reviewers to determine whether the paper is worthy of publication; their advice represents the "peer review".

Although there are no universal criteria by which reviewers judge papers, there are some generally accepted standards. Typically, papers are judged on validity, originality, methodology, findings, discussion, theoretical perspective, and the paper having sufficiently important findings worthy of publication. If the reviewers agree that these criteria have been met, the paper may be sent back to the author(s) for revisions prior to acceptance or accepted for publication without alteration (Tipler, 2003). For the last 50 years there has been relatively little change to the peer review process, although with the advent of the internet, the process has become primarily electronic.

Promoting fairness and quality

The effort by academic journals to promote quality and fairness through the peer review has been met with mixed results (Armstrong, 1997; Holub *et al.*, 1991). Evidence exists that peer review improves the quality of reporting of research (Locke, 1985; Gardner and Bond, 1990; Goodman *et al.*, 1994), but peer review is also susceptible to bias (Wood *et al.*, 2004; Starbuck, 2003; Horton, 2002; Maddox, 1992; Horrobin, 1996; Locke, 1988; Wenneras and Wold, 1997). Peters and Ceci's (1982) research is widely cited among those suspicious of the peer review process. The researchers re-submitted 12 articles to psychology journals which had published these same articles 18-32 months previously, after changing the names of the authors and institutions and a few other minor details. Only three of the articles were recognised, and eight of the remaining nine were rejected by the same journals that had originally published them.

Techniques designed to protect the identity of the writer and provide a greater degree of quality to the peer review system have also provided mixed results (Hill and Provost, 2003; Mahoney, 1977; Godlee *et al.*, 1998; Gorman, 2007) (NB: Gorman not in list of references). Masking reviewers to author identity, known as blind review, has proven difficult as commonly practised. According to Justice *et al.* (1998), manuscripts of well-known authors are difficult to disguise. Hill and Provost's (2003) research support this notion, correctly identifying authorship of blinded manuscripts almost 50 per cent of the time, using only citations as evidence.

Starbuck's, 2005 analysis of articles published in both high- and low-prestige journals contributes to the confusion among academics who engage in publication. Although higher-prestige journals publish more high-value articles, selection involves considerable randomness. According to Starbuck (2005, p. 197):

Highly prestigious journals publish quite a few low-value articles, low-prestige journals publish some excellent articles, and excellent manuscripts may receive successive rejections from several journals. Evaluating articles based primarily on which journals published them is more likely than not to yield incorrect assessments of articles' values. Yet personnel evaluations by many departments and schools seem to underestimate or even to ignore this randomness, and in extreme cases these evaluations focus on one myopic measure.

It is Starbuck's further assertion that a reviewer's decision on what is worthy of publication is the primary deficiency within the scholarly publishing industry:

The act of rendering judgment creates a hierarchical relation between a reviewer and an author that benefits neither of them and that may keep innovative research from appearing in prestigious journals . . . Even when a reviewer intends to say "perhaps this might be a useful suggestion", the author is likely to hear "do this or we will reject your manuscript" (Starbuck, 2005, p. 344).

Recognising the problems inherent with determining merit based solely on acceptance rates, some educational institutions review "impact rates" of publications in order to determine merit. Thomson Scientific (1994) defines impact as a measure of the frequency with which the "average article" in a journal has been cited in a particular year. Scholars have noted the imperfect nature of the impact factor (Hecht *et al.*, 1998). Among several leading arguments Lawrence (2001) discusses the higher impact of freely available online journals as compared to traditional print formats. Lawrence's argument is intuitive, given that free online journals are accessible to anyone with a web browser, whereas obtaining print journals can in many instances involve a subscription or proximity to a library or other venue with suitable database or print access.

According to research by Howard and Wilkinson (1998), journal editors tend to be able to determine what is clearly not acceptable for publication, but there is considerably less agreement on what is suitable. Rothwell and Martyn's (2000) study provided evidence that agreement between reviewers in the field of clinical neuroscience was not more significant than would be expected by chance alone. Gottfredson *et al.* (as cited in Starbuck, 2003) found that reviewers for psychology journals strongly agree with each other about the properties that submitted articles ought to exhibit. Unfortunately, reviewers fail to find consensus when asked about the properties of specific articles.

Timeliness

Even in the age of the internet many journals take more than a year to review and publish a paper. For instance the average time between submission and acceptance in the *American Journal of Physical Anthropology (AJPA)* has increased from 6.9 months in 1980 to 15.7 months in 1996 (Henneberg, 1997). Ellison (2002) has observed that systematic peer review in the field of economics was taking on average about 12 to 18 months longer in 2000 than in 1970. He attributes this slowdown to:

- manuscripts becoming longer;
- manuscripts having more co-authors; and
- increasing focus on publishing in a few very prestigious journals.

By Ellison's estimate these factors accounted for less than one half of the slowdown that has occurred, and his investigation revealed no evidence that published articles had significantly higher quality in 2000 than in 1970. Given the state of the peer review process, in order to write, submit, edit and print a refutation or a correction to a previously published work would take in excess of several months or even years in a majority of cases (Henneberg, 1997; British Medical Journal, 2007). While it is possible to account for time involved in the review and publication process, it is not possible to obtain data on the costs associated with peer review, as most reviewers and editors are not paid for their work (Smith, 2006).

The extraordinary amount of knowledge produced in today's academic environment prevents the traditional peer-review system from operating effectively. It developed at a time when the focus, scope and scale of academic knowledge production were dramatically different. This ineffectiveness has manifested itself in peer review's inability to promote a uniform standard of fairness, quality and timely publication

If we accept the notion that the traditional peer review process is an imperfect method, what are the societal effects regarding the long delay between the construction and dissemination of new information? These supposed flaws in the traditional peer-review process suggest practices must be updated to match the rapid creation and diffusion of knowledge that characterises the 21st century. This paper discusses the Wikipedia concept as a potential model for more rapid and reliable dissemination of scholarly knowledge and provides examples of how some scholars are attempting to mediate the boundaries between traditional and contemporary modes of knowledge production and dissemination.

Wikipedia as a recognised medium for scholarly publication?

The internet enables users to produce and distribute content almost as easily as they receive it. One specific novel application, Wikipedia (2007a), the online encyclopedia, has been the source of considerable media attention, casting it in both a positive and negative light.

The Wikipedia project was started in 2001 by Jimmy Wales as an international online venture with a goal of creating a free encyclopedia in multiple languages. Wikipedia derives its name from "wiki", named for the Hawaiian word "quick" (Ang *et al.*, 2005), and encyclopedia, a collection of information about things humans know. As of 2006, Wikipedia articles were written in 251 different languages (Wikipedia, 2007b). According to Wikipedia (2007c), "a wiki is a type of web site that allows users

to easily add, remove, or otherwise edit and change some available content, sometimes without the need for registration". Wikis are expandable web pages that incorporate a database system for storing and modifying information, each web page is editable by any user with a web browser (Leuf and Cunningham, 2001).

Similar to scientific communities, contributors to Wikipedia seek to collaboratively identify and publish facts about various subjects. Unlike scientific publications Wikipedia does not explicitly credit authors for their work in bylines; the collaborative model simply does not afford direct attribution of authorship (Forte and Bruckman, 2005). A wiki displays the latest version of each page of content; although a user may access the older versions and, if desired, replace or roll back the content of a new version with an older one (Barton, 2005). Because every edit is recorded and thus can be retraced by any other user, each version of a document is available in its revision history and can be compared to other versions (Voss, 2005). This ease of interaction and operation makes a wiki an effective tool for collaborative authoring. Using wiki software, thousands of volunteers collaboratively write, update and edit articles. Within three years the Wikipedia project, which is the world's largest Open Content project, has exceeded 1,500,000 articles, outnumbering all other encyclopedias (Voss, 2005). In addition, Wikipedia is also one of the 20 most popular web sites in the world (Alexa, 2007).

In an increasingly demanding work environment Wikipedia provides the opportunity to streamline research and link to source documents. As demonstrated by its dramatic growth and capacity to stay abreast of current events, Wikipedia is indeed a growing organism. Despite these facts numerous academics assert that Wikipedia is not an appropriate tool for use in scholarly settings (Achterman, 2005; Magnus, 2006; McArthur, 2006; Wyatt as quoted in *Inside Higher Education*, 2007). However, what may be most interesting and most overlooked by concerned academics is Wikipedia's ability to mediate a conversation between differing points of view held by users or contributors to the subject at hand. Essentially Wikipedia has the ability to transform opaque information into a useful, reliable form in a very short period of time. The ability to transform information and promote dialogue between disparate users provides Wikipedia with a definite advantage over traditional printed and static online content (Deuze, 2006; Bryant *et al.*, 2005; Lih, 2004).

Promoting collaboration

Wikipedia has enjoyed significant success as a community in which people with both complementary and contrasting perspectives can collaborate to create a single document (Viégas *et al.*, 2004). Wiki articles can have a large number of authors, as all users of the site are encouraged to contribute. This parallels the academic world, where increasingly multi-authorship is the norm (Vuèkoviaè-Dekiaè, 2000; Regalado, 1995). Wikis, and specifically Wikipedia, are designed with simplicity in mind; the application does not require knowledge of software or programming capabilities in order to contribute and participate. A basic understanding of how to navigate the internet and use a word processor is the only technical requirement for participation. Information in Wikipedia is primarily text-based, though the web site does incorporate graphics, animation and sound (Barton, 2005). According to Voss (2005), the number of distinct authors per Wikipedia article – a number that Lih (2004) called "diversity" – follows a power law distribution. Voss's in-depth analysis of the German-language version of Wikipedia reveals the following regarding authorship: "almost half of the

articles (47.9 percent) have less than five distinct authors and almost a quarter (27.6 per cent) of all articles in the German Wikipedia of 1 September 2004 had only been edited by one logged-in user. Note that anonymous edits are omitted in this calculation. The number of anonymous edits varies by language between 10 per cent (Italian) and 44 per cent (Japanese)" (Voss, 2005, p. 6).

The wiki concept encourages the division of work and a focus on an individual's perceived strengths. Some users concentrate on correcting language and grammar, some on linking articles and others on mediating in a knowledge-based dispute. Like other online media, Wikipedia also attracts vandals (users intentionally writing nonsense) and trolls (users provoking for the sake of discussion) but the possibility of restoring any article version decreases their ability to do harm (Voss, 2005). The popular media has extensively covered several instances of vandalism and inappropriate usage (O'Donnell, 2007; Rosenzweig, 2006; MSNBC, 2006; Helm, 2005; Terdiman, 2005).

To assist in the effort to promote quality and counteract deliberate vandalism, Reliable Wikipedians, the name given to active members of the Wikipedia community, receive administrative status so they can restore articles more quickly, delete and undelete articles and ban users if needed. It is the Wikipedia community that determines who within this community is trustworthy enough to be granted administrative status. Within this community there is a concerted effort to reach consensus in such administrative decisions. At first glance this community of editors and administrators with no prerequisite requirements for admission seems like a frightening concept, though it is a concept with considerable merit. Economist and philosopher Friedrich Hayek (1945) contradicted the notion of scientific knowledge as the sum of all understanding asserting that every individual is in control of certain information that is beneficial in multiple domains. If we take into account Hayek's thoughts regarding information and remember the speed and accuracy by which Wikipedia can right a wrong or a malignant posting, it is soon apparent that this editing system not only has the potential for efficiency but effectiveness.

The wiki has the ability to promote a unique style of writing that is mostly unobserved in the commercial press, where only the finished product is represented (Barton, 2005). Due to Wikipedia's editing process, previous versions of documents are listed in the article's version history, where users can highlight differences between selected versions. In addition articles can be selected for placement on a watch list, which will notify the user of future changes. All changes are listed on a recent changes web site, an important place to observe new contributors and suspect edits. According to Voss (2005), there are approximately 16 edits per minute in the English-language Wikipedia. Many of these changes, about 22 per cent, are made by anonymous users of the English-language Wikipedia. Research by Lih (2004) indicates a linkage between Wikipedia as a "working draft of history" and current news events. A great many internet users visit Wikipedia and contribute to it of their own volition; Lih's study points to clear cases where a topical citation in the mainstream press has driven traffic directly to articles and has improved them as a result. Lih describes the use of more "eyeballs" as a unique feature of this "participatory journalism", as it benefits directly from more traffic and more users making their impression by scrutinising or contributing to content. The resulting feedback loop between reading and editing provides for a rapid progression of content knowledge, providing a unique function that traditional media is incapable of employing (Voss, 2005; Lih, 2004).

Reliability and validity of Wikipedia content

Recent studies (Wilkinson and Huberman, 2007; Giles, 2005; Anthony *et al.*, 2005) provide evidence that articles contained within Wikipedia are reliable and valid. That being said, several current media events have focused on inaccuracies found within Wikipedia (MSNBC, 2006; Helm, 2005; Terdiman, 2005). A widely reported instance occurred involving John Seigenthaler, a journalist and a former official in the Kennedy administration, who determined that Wikipedia contained an inaccurate and defamatory biography article about him in 2005 (Ramasastry, 2005; Helm, 2005). Another extensively reported event in 2006 involved senatorial staffers altering factual information about political rivals. Research conducted by Stvilia *et al.* (2005a, 2005b) shows that the Wikipedia community takes issues of quality seriously. Although anyone can participate in editing articles, the results are carefully reviewed and discussed in ways very similar to open-source programming projects (McGuinness *et al.*, 2006).

Another incident, painted in a negative light, was the death of Kenneth Lay, former CEO of Enron Corporation (Ahrens, 2006). Immediately following the announcement of Lay's death there was considerable speculation regarding conspiracy theories (MSNBC, 2006). Wikipedians avidly followed the development of this possibility, and Lay's Wikipedia article received considerable traffic in the ensuing media frenzy. Ganesan (2006) summarises Ahren's recount of the following details regarding *Wikipedia's* reporting regarding Lay on July 5, 2006:

10am, July 5, 2006: News organisations report Lay's death due to an apparent heart attack.

10:06am: First *Wikipedia* update on Lay. Wrongly claims his death was "an apparent suicide".

10:08am: Updated to say cause of death was "an apparent heart attack or suicide".

10:08am: Updated again to say cause of death is "yet to be determined".

10:11am: Comment added to imply that guilt from the Enron scandal caused the suicide.

10:12am: Cause of death correctly identified as being due to massive coronary, as reported by Lay's pastor.

10:39am: More speculation as to the cause of the heart attack, but clearly identified as such.

Afternoon: Stable entry with correct facts.

Ahrens incorrectly attributes this flurry of edits within Wikipedia to acts of deceit carried out by individuals with an agenda. He calls for better citizen journalism and points to this instance as an example of Wikipedia's shortcomings. Ganesan (2006 page number needed for direct quote) disagrees, stating:

... the story here is not that anyone can deface *Wikipedia* with blatant untruths. (After all, that is an obvious consequence of global editability.) The story is the rapidity with which correct information percolates into the system and falsehood is eliminated! It amazes me that the information on Lay was updated within twelve minutes of his death and that it was fact-checked and corrected within a few hours. What other knowledge repository has this kind of latency to correct information?

Ken Lay's demise is an example of the evolving nature of reality and its reflection in Wikipedia. Almost as soon as Lay died, information was added to his article. Throughout the first few hours of the story breaking, with facts uncertain, the wording

changed several times. Within 24 hours over 140 individual edits were conducted on the article, resulting in a respectable and well-written description of his death (Wikipedia, 2007d). Most importantly, if new information is made available tomorrow regarding Lay, the article will be changed to reflect the latest developments. Barton (2005, p. 189) states:

... wiki's challenge notions of traditional authority and traditional academic legitimating criteria ... even *The New York Times* makes grievous mistakes from time to time, and it is troubling to fathom how many reports issuing from corporate-controlled mass media have been colored to protect private interests. In short, ceding the problem of legitimation to corporate interests and so-called official sources does not solve the problem, so one might as well take a chance on ones peers.

Mirela Roncevic, Associate Editor of the *Library Journal Book Review*, has suggested that Wikipedia's content receive a librarian's seal of approval based on comments from three long-time reviewers specialising in popular culture, current affairs and science (Miller *et al.*, 2006). Viégas *et al.* (2004) concluded that Wikipedia and its audience are to be viewed as a system in which constant change is a source of strength as well as weakness. The site is subject to frequent vandalism and inaccuracy, just as sceptics have asserted – but the active Wikipedia community rapidly and effectively repairs most damage quickly in most cases. One type of malicious action, mass deletions, is repaired within an average of two minutes.

Discussion

Adoption of a Wikipedia or wiki-based open-source, content-malleable system as the standard for knowledge creation and distribution would create a fundamentally new archetype for academia. This model would effectively move the peer-review forum out from behind closed doors into the public arena, allowing the entire internet community to participate in the vetting and debate of new ideas. Today's academics publish to a small audience of like-minded individuals, namely, other scholars, with the means and ability to access either a print edition of a journal or a database at a public or university library (Harding and Taylor, 2002). By transporting knowledge into the public arena academia effectively promotes participation by anyone who wishes to collaborate, contribute or offer insight, regardless of geographic boundaries or academic pedigree.

In his influential article on open source software, "The Cathedral and the Bazaar", Raymond (2001, p. 19) introduces Linus' Law (named for Linus Torrvalls, the founder of Linux): "given enough eyeballs, all bugs are shallow". Linus' Law disputes the notion that problems and conflict can be efficiently and effectively remunerated behind closed doors. Raymond's comment, while made in application to programmatic code, parallels the current state of affairs in the academic world.

Editors struggle to manage the massive amounts of data that are being constructed and submitted for comprehensive academic review. Provided the best of all possible situations, academic review consists of relatively few "eyeballs" providing input on specific subject matter. As research domains become even more highly specialised and specific, few editors can claim to have expertise in the complete range of an academic domain. The solution is to enable a greater number of "eyeballs" to see, challenge and contribute to academic writing. This solution is embodied by the current wiki-based academic endeavours that promote a high-risk, high-return market for the construction of academic capital. The academic world relies on a process that is inherently

inefficient in order to justify the validity and reliability of the knowledge that is produced. The solution is to move towards open, collaborative access to knowledge, and to do so in a manner that allows for the retention of ownership and recognition by the knowledge creators.

To borrow from Raymond's metaphor, wikis have the power to move the world of academic peer review from a process conducted in a cathedral (or academic ivory tower) to one conducted in a bazaar (or academic open market). Some academic classrooms have already attempted to create this open market. Utilising MediaWiki, the software that makes Wikipedia successful, several notable academic experiments have served as valuable experiences for learners and powerful examples of the wiki in academia. The Romantic Audience Project (Phillipson, 2004) at Bowdoin College enabled students to move from passive consumption of web resources to actively and collectively authoring, linking, critiquing and incorporating rich multimedia utilising a wiki. The result was a collective work authored by the entire class, authenticating and building upon the material they studied.

Auburn University's Wikifish is a "...collaborative created [a collaborative WHAT?] by the Students, Faculty and Staff of the Auburn University School of Architecture. This wiki serves to protect the delicate collaborative environment of design studio culture, and to serve as a protocol and reference guide to keep these balances in check" (Wikifish, 2007). Circumventing the often cumbersome task of publishing content to an HTML-based web page, Dickinson College utilises wikis to enable students to publish collaborative writing projects (Bryant, 2006). Oravec (2002) has pointed out that wikis can be used to enhance students' critical thinking, literacy skills and ability to use the internet for research purposes. According to Chen *et al.* (2005), the use of wikis in an undergraduate engineering course supports the process of coached reflection and played an important role in students' reflective learning in engineering design, and more broadly in university education.

One journal in particular has also attempted to embrace the online world. *Contemporary Issues in Technology and Teacher Education (CITE)* is an online journal that utilises a unique commentary feature. This feature enables readers to write responses to articles published in a commentary strand linked to the article, thereby promoting an interactive medium to develop an ongoing, peer-reviewed dialogue (CITE, 2007). Other journals have done away with print versions, focusing solely on online publication (De Groote and Dorsch, 2001; Abate, 1997).

While the case for the utilisation of Wikipedia or a Wikipedia-like tool for the construction and dissemination of knowledge throughout academia has merit, the implementation of such a project would constitute a complex undertaking. The process would fundamentally alter the way information is generated in society. If the use of an open-source, content-malleable system such as Wikipedia became the standard for knowledge dissemination, the university knowledge production system would experience drastic changes in the way it conducts its operations. Academic institutions would have to revisit the roles of tenure, merit, intellectual property and grant-funded research.

The adoption of open knowledge dissemination would have dramatic effects for commercial academic publishers. Subscription pricing for access to academic knowledge increased over 200 per cent from 1986-2004 (ARL, 2005), and this cost increase has resulted in a crisis in academic libraries worldwide (Chang, 2006). Individual statistics on commercial publishers' profits are often hard to come by, but

estimates by Bergstrom (2001) provide evidence that there is a considerable upside to providing for pay access to academic publications. Naturally these commercial interests would be opposed to a situation in which the substance of their products was released to the general public free of charge.

Applications that harness the collective intelligence of their users, like Wikipedia, effectively erase the lines of idea ownership and authorship. The construction of knowledge via a dynamic collaborative medium creates copyright, information ownership and intellectual property issues. The implications of this new form of knowledge creation would have a profound effect on the ability of funding institutions to determine success, academic institutions to award merit, and individuals to experience personal reward and growth through singular achievement.

Lanier (2006) argues that individuals within the scientific community are important and provide a service through their internal checks-and-balances that the collective intelligence lauded as superior by proponents of Wikipedia cannot accomplish. Lanier maintains that the tenure process is one such system that supports the power of the individual. According to Kasten (1984), academic production is influenced by the desire for and attainment of tenure, which is strongly coupled with research production. Academics and academic institutions support tenure on the grounds that it protects academic freedom, attracts people of ability to the profession and ensures a cadre of committed long-term professionals (Illinois State University, n.d.). The granting of tenure has liberated the faculty member to become a more productive and important contributor to the quality of academic and campus life. Tenured faculty members are motivated by a pride in their profession, a sense of responsibility and the recognition that they are the real “owners” of the institution (Cotter, 1996; Li and Ou-Yang, 2003).

Even in the world of open source software, where collective intelligence rules, socially-linked motivations still exist. Early participants in the open-source movement cited an enthusiasm based on the values of the hacker culture: freedom of enquiry, sharing of information and distrust of authority (Raymond, 2001). Economic theorists have detailed motivations evident in open-source participants, which have changed now that the open-source movement has lost some of its counterculture novelty. New motives include gaining a reputation among one’s peers, signalling quality of human capital and learning, in addition to filling an unfilled market, altruism and software freedom (Green, 1999; Lerner and Tirole, 2002; Dalle and David, 2003). These motivations parallel impulses evident in the traditional scientific community (David, 1991), though this community places considerable value in offering credit for accomplishments. What may be surprising is that Linux programmers are not anonymous; though some may be motivated by altruism, personal glory is part of the motivational dynamic that propels today’s open-source movement (Lanier, 2006).

From Wikipedia to Citizendium

Collaborative production has emerged as an alternative model of information creation that will have profound effects not just on the academic world, but also on industry (Tapscott and Williams, 2007). Recognising the inherent reliability issues that are often cited as problematic with the model that Wikipedia has adopted, the Wikimedia Foundation is scheduled to launch a new forum for collaborative knowledge building, Citizendium. Citizendium, the citizen’s encyclopedia, describes itself as an expert-led, public participatory, wiki-based project to sum up human knowledge (Citizendium,

2007). Sanger (2006) illustrates Citizendium as a progressive evolution of Wikipedia, one that will incorporate the existing knowledge built by Wikipedia and offer a forum for expert review by a group of editors and collaborators required to provide their real names. Citizendium's decision to promote personal responsibility through the use of non-anonymous editing is a welcome answer to the criticisms that are often aimed at Wikipedia's free-wheeling culture of anonymity. While the notion of an editor seems to reflect the ideals of the existing peer-review process, Citizendium asserts that editors will not have the right to direct work in a top-down fashion. Furthermore, editors, who self-select into the role, must state their credentials and qualifications to the general public for review (Sanger, 2006).

The Citizendium model, while a step in the right direction, does not fully constitute an answer to many of the problems that collaborative knowledge production creates for academics. It is unlikely that a tool will be developed that adequately addresses the concerns that exist for today's academics: tenure, copyright, grant funds. The ultimate solution will reside in a conciliatory move by both the academics and the technology producers, one that keeps intact the established academic dogma and hierarchy.

Conclusion

Given the dramatic growth in knowledge production over the last decades and the ubiquity of information-based tools such as the personal computer and internet, it is safe to assume that the academic knowledge dissemination market will continue to experience bottlenecks. It is time for the entire academic community to revisit the publication process built over 50 years ago. Traditional peer review and publication in print journals cannot continue to keep pace with the development of new ideas. Golde and Walker (2006) describes academics as keepers of knowledge entrusted with an ethical imperative towards accurately generating, transforming and disseminating new knowledge. Publishing in an open, participatory milieu invites involvement from those outside traditional academic environments. Working in a free, open environment, scholars can increase their potential readership exponentially (Alexa, 2007); through this process academics can assure themselves that knowledge access is granted to individuals who might not have access to print journals or expensive databases, thus fulfilling their role as keepers and disseminators of knowledge.

References

- Abate, T. (1997), "Publishing scientific journals online", *Bioscience*, Vol. 47 No. 3, pp. 175-80.
- Achterman, D. (2005), "Surviving Wikipedia: improving student search habits through information literacy and teacher collaboration", *Knowledge Quest*, Vol. 33 No. 5, pp. 38-40.
- Ahrens, F. (2006), "Death by Wikipedia: the Kenneth Lay chronicles", *The Washington Post*, 7 September, p. F07.
- Alexa (2007), *Traffic Rankings*: www.wikipedia.org, available at: www.alexam.com/data/details/main?q=andurl=http://www.wikipedia.org (accessed 26 October 2007).
- Ang, C.S., Zaphiris, P. and Wilson, S. (2005), "Wiki-supported collaborative narrative construction in game communities", paper presented at the 9th European Conference on Computer-Supported Co-operative Work (ECSCW '05) Workshop on Computer Games and CSCW, 18-22 September, Paris, available at: www.soi.city.ac.uk/~zaphiri/Papers/wikimedia05.pdf

- Anthony, D., Smith, S. and Williamson, T. (2005), "Explaining quality in internet collective goods: zealots and good samaritans in the case of Wikipedia", paper presented at the Fall 2005 Innovation and Entrepreneurship Seminar at MIT, available at: <http://web.mit.edu/iandeseminar/Papers/Fall2005/anthony-pdf> (accessed 16 October 2007).
- Armstrong, J.S. (1997), "Peer review for journals: evidence on quality control, fairness, and innovation", *Science and Engineering Ethics*, Vol. 3, pp. 63-84.
- Association of Research Libraries (2005), "Monograph and serial costs in ARL libraries, 1986-2004", available at: www.arl.org/stats/arlstat/graphs/2004/monser04.pdf (accessed 25 October 2007).
- Barton, M.D. (2005), "The future of rational-critical debate in online public spheres", *Computers and Composition*, Vol. 22 No. 2, pp. 177-90.
- Bergstrom, T.C. (2001), "Free labor for costly journals?", *The Journal of Economic Perspectives*, Vol. 15 No. 4, pp. 183-98.
- British Medical Journal* (2007), "Welcome to resources for authors", available at: [British Medical Journal http://resources.bmj.com/bmj/authors](http://resources.bmj.com/bmj/authors) (accessed 22 June 2007).
- Bryant, S.L., Forte, A. and Bruckman, A. (2005), "Becoming Wikipedian: transformation of participation in a collaborative online encyclopedia", in *Conference on Supporting Group Work (SIGGROUP 2005)*, ACM Press, New York, NY, pp. 207-214.
- Bryant, T. (2006), "Social software in academia", *EDUCAUSE Quarterly*, Vol. 29 No. 2, pp. 61-4, available at: www.educause.edu/ir/library/pdf/eqm0627.pdf (accessed 22 June 2007).
- Chang, C. (2006), "Business models for open access journals publishing", *Online Information Review*, Vol. 30 No. 6, pp. 699-713.
- Chen, H.L., Cannon, D.M., Gabrio, J. and Leifer, L. (2005), "Using wikis and weblogs to support reflective learning in an introductory engineering design course", paper presented at the 2005 American Society for Engineering Education Annual Conference and Exposition, Portland, Oregon, available at: http://rie.stevens.edu/fileadmin/rie/pdf/ASEE2005_Paper_Wikis_and_Weblogs.pdf
- CITE Journal* (2007), "Contemporary issues in technology and teacher education", *Contemporary Issues in Technology and Teacher Education*, Vol. 7 No. 1, available at: www.citejournal.org/vol7/iss1/ (accessed 22 October 2007).
- Citizendium (2007), "Main page – Citizendium", available at: http://en.citizendium.org/wiki/Main_Page (accessed 23 October 2007).
- Cotter, W.R. (1996), "Why tenure works", *Academe*, Vol. 82 No. 1, pp. 26-9.
- Dalle, J.M. and David, P.A. (2003), "The allocation of software development resources in open source production mode", MIT Working Papers, available at: <http://opensource.mit.edu/papers/dalledavid.pdf> (accessed 26 October 2007).
- David, P. (1991), *Reputation and Agency in the Historical Emergence of the Institutions of Open Science*, Stanford University, CA, March, mimeo.
- De Groote, S.L. and Dorsch, J.L. (2001), "Online journals: impact on print journal usage", *Bulletin of the Medical Library Association*, Vol. 89 No. 4, pp. 372-8.
- Deuze, M. (2006), "Ethnic media, community media and participatory culture", *Journalism*, Vol. 7 No. 3, pp. 262-80.
- Ellison, G. (2002), "The slowdown of the economics publishing process", *Journal of Political Economy*, Vol. 110 No. 5, pp. 947-93.
- Forte, A. and Bruckman, A. (2005), "Why do people write for Wikipedia? Incentives to contribute to open-content publishing", *Proceedings of the Workshop at Group 2005, Sanibel Island*,

-
- FL, *Sustaining Community: The Role and Design of Incentive Mechanisms in Online System*, available at: www-static.cc.gatech.edu/~aforfe/ForteBruckmanWhyPeopleWrite.pdf
- Ganesan, P. (2006), "Is Wikipedia's criticism justified?", *Random Ratiocination*, available at: <http://randomratio.blogspot.com/2006/07/is-wikipedia-criticism-justified.html> (accessed 24 October 2007).
- Gardner, M.J. and Bond, J. (1990), "An exploratory study of statistical assessment of papers published in the *British Medical Journal*", *JAMA: Journal of the American Medical Association*, Vol. 263, pp. 1355-7.
- Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M. (1994), *Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies*, Sage, London.
- Giles, J. (2005), "Internet encyclopedias go head to head", *Nature*, Vol. 438, pp. 900-1.
- Godlee, F., Gale, C.R. and Martyn, C.N. (1998), "Effect on the quality of peer review of blinding reviewers and asking them to sign their reports: a randomized controlled trial", *JAMA: The Journal of the American Medical Association*, Vol. 280, pp. 237-40.
- Golde, C. and Walker, G (Eds) (2006), *Envisioning the Future of Doctoral Education: Preparing Stewards of the Discipline – Carnegie Essays on the Doctorate*, Jossey Bass, San Francisco, CA, available at: www.carnegiefoundation.org/perspectives/sub.asp?key=245&subkey=1811 (accessed 28 October 2007).
- Goodman, S.N., Berlin, J., Fletcher, S.W. and Fletcher, R.H. (1994), "Manuscript quality before and after peer review and editing at the *Annals of Internal Medicine*", *Annals of Internal Medicine*, Vol. 121, pp. 11-21.
- Green, E.L. (1999), "Economics of open source software" (updated 6 December 2002), *Badtux.org*, available at: <http://badtux.org/home/eric/editorial/economics.php> (accessed 28 October 2007).
- Harding, G. and Taylor, K.M.G. (2002), "Academic assessment in the carceral society", *Pharmacy Education*, Vol. 1, pp. 77-82.
- Harnad, S. (1999), "Free at last: the future of peer-reviewed journals", *D-Lib Magazine*, Vol. 5 No. 12, available at: <http://eprints.ecs.soton.ac.uk/2623/2/harnad00.dlib.html>
- Hayek, F. (1945), "The use of knowledge in society", *American Economic Review*, Vol. 35, pp. 519-30.
- Hecht, F., Hecht, B. and Sandberg, A. (1998), "The journal 'impact factor': a misnamed, misleading, misused measure", *Cancer Genetics and Cytogenetics*, Vol. 104 No. 2, pp. 77-81.
- Helm, B. (2005), "Wikipedia: a work in progress", *Businessweek*, 14 December, available at: www.businessweek.com/technology/content/dec2005/tc20051214_441708.htm?chan=db (accessed 22 October 2007).
- Henneberg, M. (1997), "Peer review: the holy office of modern science", *naturalSCIENCE*, Vol. 1, available at: http://naturescience.com/ns/articles/01-02/ns_mh.html (accessed 28 October 2007).
- Hill, S. and Provost, F. (2003), "The myth of the double-blind review?", *Author identification using only citations, SIGKDD Explorations Newsletter*, Vol. 5 No. 2, pp. 179-84.
- Holub, H.W., Tappeiner, G. and Eberharter, V. (1991), "The iron law of important articles", *Southern Economic Journal*, Vol. 58, pp. 317-28.
- Horrobin, D.F. (1996), "Peer review of grant applications: a harbinger for mediocrity in clinical research?", *Lancet*, Vol. 348, pp. 1293-5.
- Horton, R. (2002), "Post-publication criticism and the shaping of clinical knowledge", *JAMA: The Journal of the American Medical Association*, Vol. 287 No. 21, pp. 2843-7.

- Howard, L. and Wilkinson, G. (1998), "Peer review and editorial decision making", *British Journal of Psychiatry*, Vol. 173, pp. 110-3.
- Illinois State University (n.d.), *White Paper No. 1 – Tenure*, available at: <http://ilt.ilstu.edu/jh Reid/isuaaup/tenure.htm>
- Inside Higher Education (2007), "A stand against Wikipedia", available at: <http://insidehighered.com/news/2007/01/26/wiki> (accessed 28 October 2007).
- Justice, A.C., Cho, M.K., Winker, M.A., Berlin, J.A. and Rennie, D. (1998), "Does masking author identity improve peer review quality? A randomized controlled trial", *JAMA: The Journal of the American Medical Association*, Vol. 280, pp. 240-2.
- Kandziora, B. (2004) Vol. 23, "An effective scientific publishing system for European research", *Europa: Gateway to the European Union*, available at: <http://ec.europa.eu/research/press/2004/pr1506en.cfm> (accessed 23 June 2007).
- Kasten, K.L. (1984), "Tenure and merit pay as rewards for research, teaching, and service at a research university", *Journal of Higher Education*, Vol. 55 No. 4, pp. 500-14.
- Lanier, J. (2006), "Digital Maoism: the hazards of the new online collectivism", *Edge*, 30 May, available at: www.edge.org/3rd_culture/lanier06/lanier06_index.html (accessed 22 October 2007).
- Lawrence, S. (2001), "Free online availability substantially increases a paper's impact", *Nature*, Vol. 411, p. 521.
- Lerner, J. and Tirole, J. (2002), "Some simple economics of open source", *Journal of Industrial Economics*, Vol. 46 No. 2, pp. 125-56.
- Leuf, B. and Cunningham, W. (2001), *The Wiki Way: Quick Collaboration on the Web*, Addison-Wesley, Upper Saddle River, NJ.
- Li, S. and Ou-Yang, H. (2003), *Incentives, Performance, and Academic Tenure*, working papers, Duke University, Durham, NC.
- Lih, A. (2004), "Wikipedia as participatory journalism: reliable sources? Metrics for evaluating collaborative media as a news resource", *Proceedings of the International Symposium on Online Journalism*.
- Locke, S.A. (1985), *Difficult Balance: Editorial Peer Review in Medicine*, Nuffield Provincial Hospitals Trust, London.
- Locke, S.A. (1988), "Fraud in medicine [editorial]", *British Medical Journal*, Vol. 296, pp. 376-7.
- McArthur, T. (2006), "Citing, quoting and critiquing the Wikipedia", *English Today*, Vol. 22 No. 3.
- McGuinness, D., Zeng, H., Ding, L., Narayanan, D. and Bhaawal, M. (2006), "Investigations into trust for collaborative information. Repositories: a Wikipedia case study", *Proceedings of Workshops on Models of Trust for the Web (MTW06)*, 22 May 2006, Edinburgh.
- Maddox, J. (1992), "Conflicts of interest declared [news]", *Nature*, Vol. 360, p. 205.
- Magnus, P.D. (2006), "Epistemology and the Wikipedia", paper presented at the North American Computing and Philosophy Conference, Rensselaer Polytechnic Institute, Troy, New York, Conference web site: www.cogsci.rpi.edu/conferences/cap/
- Mahoney, M. (1977), "Publication: an experimental study of confirmatory bias in the peer review system", *Cognitive Therapy and Research*, Vol. 1 No. 2, pp. 161-75.
- Miller, B., Helicher, K. and Berry, T. (2006), "I want my Wikipedia!", *Library Journal*, Vol. 131 No. 6, available at: LibraryJournal.com, <http://www.libraryjournal.com/article/CA6317246.html> (accessed 22 October 2007).
- MSNBC (2006), "Readers smell conspiracy in lay's sudden death", MSNBC, available at: <http://msnbc.msn.com/id/13722699/> (accessed 26 October 2007).

-
- O'Donnell, D.P. (2007), "If I were 'you': how academics can stop worrying and learn to love 'the encyclopedia that anyone can edit'", *The Heroic Age: A Journal of Early Medieval Northwestern Europe*, No. 10, May, available at: www.heroicage.org/issues/10/em.html
- Oravec, J. (2002), "Bookmarking the world: weblog applications in education", *Journal of Adolescent and Adult Literacy*, Vol. 45 No. 7, pp. 616-21.
- Peters, D.P. and Ceci, S.J. (1982), "Peer review practices of psychological journals: the fate of published articles, submitted again", *Behavioral Brain Science*, Vol. 5, pp. 187-255.
- Phillipson, M. (2004), "The romantic audience project: a wiki experiment", *Innovations, a Special Issue of the Romantic Pedagogy Commons*, available at: www.rc.umd.edu/pedagogies/commons/innovations/contents.html (accessed 26 October 2007).
- Ramasastri, A. (2005), "Is an online encyclopedia, such as Wikipedia, immune from libel suits?", *Findlaw Legal News and Commentary*, available at: <http://writ.news.findlaw.com/ramasastri/20051212.html> (accessed 26 October 2007).
- Raymond, E.S. (2001), *The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary*, rev. ed., O'Reilly, Sebastopol, CA.
- Regalado, A. (1995), "Multi-author papers on the rise", *Science*, Vol. 268 No. 25, pp. 785-6.
- Rosenzweig, R. (2006), "Can history be open source? Wikipedia and the future of the past", *Journal of American History*, Vol. 93 No. 1, pp. 117-46.
- Rothwell, P. and Martyn, C. (2000), "Reproducibility of peer review in clinical neuroscience: is agreement between reviewers any greater than would be expected by chance alone?", *Brain*, Vol. 123 No. 9, pp. 1964-9.
- Sanger, L. (2006), "Toward a new compendium of knowledge (longer version)", *Citizendium*, available at: www.citizendium.org/essay.html
- Sense About Science (2005), "I don't know what to believe: making sense of science stories", *Sense about Science*, available at: www.senseaboutscience.org.uk/index.php/site/project/32 (accessed 26 October 2007).
- Smith, R. (2006), "Peer review: a flawed process at the heart of science and journals", *JRSM: Journal of the Royal Society of Medicine*, Vol. 99, pp. 178-82.
- Starbuck, W.H. (2003), "Turning lemons into lemonade: where is the value in peer reviews?", *Journal of Management Inquiry*, Vol. 12 No. 4, p. 344.
- Starbuck, W.H. (2005), "How much better are the most prestigious journals? The statistics of academic publication", *Organization Science*, Vol. 16, pp. 180-200.
- Stvilia, B., Twidale, M.B., Gasser, L. and Smith, L.C. (2005a), "Information quality discussion in Wikipedia", *Proceedings of the 2005 International Conference on Knowledge Management*, pp. 101-13.
- Stvilia, B., Twidale, M.B., Gasser, L. and Smith, L.C. (2005b), "Information quality discussions in Wikipedia", Technical Report ISRN UIUCLIS, 2005/2 + CSCW, PDF, A revised version appeared as: "Information quality in a community-based encyclopedia", in Hawamdeh, S. (Ed.), *Knowledge Management: Nurturing Culture, Innovation, and Technology – Proceedings of the 2005 International Conference on Knowledge Management*. Charlotte, NC, World Scientific Publishing Company, Charlotte, NC, pp. 101-13.
- Tapscott, D. and Williams, A. (2007), *Wikinomics: How Mass Collaboration Changes Everything*, Portfolio, New York, NY.
- Terdiman, D. (2005), "Newsmaker: in search of the wikipedia prankster", available at: http://news.com.com/In+search+of+the+Wikipedia+prankster/2008-1029_3-5995977.html?tag=st.num (accessed 26 October 2007).

- Thomson Scientific (1994), *The ISI Impact Factor*, Thomson Scientific, available at: <http://scientific.thomson.com/free/essays/journalcitationreports/impactfactor/> (accessed 23 October 2007).
- Tipler, J. (2003), "Refereed journals: do they insure quality or enforce orthodoxy?", available at: http://www.iscid.org/papers/Tipler_PeerReview_070103.pdf (accessed 26 October 2007).
- Viégas, F.B., Wattenberg, M. and Dave, K. (2004), "Studying cooperation and conflict between authors with history flow visualizations", *Proceedings of ACM SIGCHI, Association for Computing Machinery Special Interest Group on Computer-Human Interaction, 24-29 April 2004, Vienna*, ACM Press, New York, NY, pp. 575-82.
- Voss, J. (2005), "Measuring Wikipedia", *Proceedings of the 10th International Conference of the International Society for Scientometrics and Informetrics (ISSI 2005), 24-28 July, Stockholm Sweden*. available at: <http://eprints.rclis.org/archive/00003610/01/MeasuringWikipedia2005.pdf>
- Vuèkovia-Dekia, L. (2000), "Multiauthorship in three oncologic scientific journals", *Archive of Oncology*, Vol. 8 No. 3, pp. 109-10.
- Wenneras, C. and Wold, A. (1997), "Nepotism and sexism in peer-review", *Nature*, Vol. 387, pp. 341-3.
- Wikifish (2007), available at: www.seedwiki.com/wiki/wikifish/wikifish.cfm
- Wikipedia (2007a), "Encyclopedia", *Wikipedia, The Free Encyclopedia*, available at: <http://simple.wikipedia.org/wiki/Encyclopedia> (accessed 26 October 2007).
- Wikipedia (2007b), "List of wikipedias", *Wikipedia, The Free Encyclopedia*, available at: http://meta.wikimedia.org/wiki/List_of_Wikipedias (accessed 26 October 2007).
- Wikipedia (2007c), "Wiki", *Wikipedia, The Free Encyclopedia*, available at: <http://en.wikipedia.org/wiki/Wiki> (accessed 26 October 2007).
- Wikipedia (2007d), "Kenneth Lay, history", *Wikipedia, The Free Encyclopedia*, available at: http://en.wikipedia.org/w/index.php?title=Kenneth_Lay&action=history (accessed 26 October 2007).
- Wilkinson, D.M. and Huberman, B.A. (2007), "Assessing the value of cooperation in Wikipedia", *First Monday*, Vol. 12 No. 4, available at: www.firstmonday.org/issues/issue12_4/wilkinson/index.html
- Wood, M., Roberts, M. and Howell, B. (2004), "The reliability of peer reviews of papers on information systems", *Journal of Information Science*, Vol. 30 No. 1, pp. 2-11.

Further reading

- Kienle, H.M., German, D., Tilley, S. and Müller, H.A. (2004), "Intellectual property aspects of web publishing", *Proceedings of the 22nd Annual International Conference on Design of Communication: The Engineering of Quality Documentation, SIGDOC '04, Memphis, Tennessee, 10-13 October*, ACM Press, New York, NY, pp. 136-44.

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