

f i ® s †

m x ñ d @ ¥

PEER-REVIEWED JOURNAL ON THE INTERNET

First Monday

[Home](#) > [Current](#) > **Volume 15, Number 3 - 1 March 2010**

Volume 15, Number 3 - 1 March 2010

Table of Contents

Individual focus and knowledge contribution

Lada A. Adamic, Xiao Wei, Jiang Yang, Sean Gerrish, Kevin K Nam, Gavin S. Clarkson

How today's college students use Wikipedia for course-related research

Alison J. Head, Michael B. Eisenberg

Peer governance and Wikipedia: Identifying and understanding the problems of Wikipedia's governance

Vasilis Kostakis

The role of advertising in financing open access journals

Jan Erik Frantsvåg

Vanguard, laggard or relic? The possible futures of higher education after the Epistemic Revolution

Dion Dennis, Jabbar Al-Obaidi

Individual focus and knowledge contribution

by Lada A. Adamic, Xiao Wei, Jiang Yang,
Sean Gerrish, Kevin K. Nam,
and Gavin S. Clarkson

Abstract

Before contributing new knowledge, individuals must attain requisite background knowledge or skills through schooling, training, practice, and experience. Given limited time, individuals often choose either to focus on few areas, where they build deep expertise, or to delve less deeply and distribute their attention and efforts across several areas. In this paper we measure the relationship between the narrowness of focus and the quality of contribution across a range of both traditional and recent knowledge sharing media, including scholarly articles, patents,

Wikipedia, and online question and answer forums. Across all systems, we observe a small but significant positive correlation between focus and quality.

Contents

Introduction
Results
Discussion
Materials and methods

Introduction

The Internet is enabling an unprecedented number and variety of individuals to contribute knowledge, by authoring content individually or collaboratively and by helping one another directly in online forums. Traditionally, knowledge generation was the purview of scholars and other professionals, who would acquire pertinent domain knowledge through time-consuming study or extensive experience. Their contributions were published in domain-specific peer-reviewed venues. Today, anyone can easily contribute knowledge online across many domains, by editing a *Wikipedia* article or answering a question in any given category on an online question and answer site. Hence it is especially important to understand the role of breadth in the quality of contribution in highly inclusive online settings.

Most individuals tend to build their expertise in a small range of fields; and experiencing success in one subject area may, through positive reinforcement and the ability to obtain more resources, result in additional focus on that subject. On the other hand, there are myriad successful individuals who dabble in many sciences, inventors who invent diverse gadgets, and *Wikipedia* editors who edit pages on seemingly disparate topics. One might argue that their versatility is a reflection of superior abilities that can yield greater opportunities for varied collaborations and cross-pollination of ideas. In this paper, we present the first comprehensive, large-scale analysis of this relationship between individual focus and performance across a broad range of both traditional and modern knowledge collections.

Previous research has aimed to quantify the benefit of interdisciplinarity among researchers at the *group* level. A study of scholarly articles in the U.K., for example, found that research articles whose coauthors are in different departments at the same university receive more citations than those authored in a single department, and those authored by individuals across different universities yield even more citations on average (Katz and Hicks, 1997). Multi-university collaborations that include a top tier-university were found to produce the highest-impact research articles (Jones, *et al.*, 2008). It has also been demonstrated that scholarly work covering a range of fields — and patents generated by larger teams of co-authors — tend to have greater impact over time (Wuchty, *et al.*, 2007). Collaborations between experienced researchers who have not previously collaborated fare better than repeat collaborations (Guimerà, *et al.*, 2005). In the area of nanotechnology authors who have a diverse set of collaborators tend to write articles that have higher impact (Rafols and Meyer, 2010). Finally, diverse groups can, depending on the type of task, outperform individual experts or even groups of experts (Page, 2007).

All of this work is evidence of a benefit in bringing together diverse individuals. It does not demonstrate, however, whether diversity in research focus is beneficial at the *individual* level. One exception is a study of political forecasting that established that “foxes”, individuals who know many little things, tend to make better predictions about future outcomes than “hedgehogs” who focus on one big thing (Tetlock, 2005). Our work addresses knowledge contribution in a much broader context than forecasting and, more importantly, quantifies the relationship between individuals’ narrowness of focus and the corresponding quality of their contributions.



Results

In order to cover a broad range of knowledge-generating activities, we study several collections of traditional scholarly publications in addition to recent, Web-based media collections. The traditional media we consider include patents and research articles. Our patent collection consists of 5.5 million patents filed with the U.S. Patent and Trademark Office (USPTO, <http://www.uspto.gov/>) between 1976 and 2006. We consider two sources of research articles: JSTOR (<http://www.jstor.org/>) and the American Physical Society (APS, <http://www.aps.org/>). The JSTOR corpus consists of two million articles from 1,108 journals in the natural sciences, social sciences, and humanities, and the APS data set we consider covers over 200,000 research articles in the single discipline of physics. We complement data from these traditional publication venues with data from two recent, online types of knowledge-sharing activity: *Wikipedia* and a collection of question–answering forums. *Wikipedia* is a collaborative online effort to document all of human knowledge in a systematic way into a popular Internet-based encyclopedia. The Question and Answer forums we study are Yahoo Answers (English) (Adamic, *et al.*, 2008); Baidu Knows (Chinese) (Yang and Wei, 2009); and Naver Knowledge iN (Korean) (Nam, *et al.*, 2009). On each of the sites, millions of questions are answered each year by individuals with a wide range of expertise.

Online knowledge-sharing activity includes not just those who specialize in knowledge generation and dissemination, *i.e.*, professional researchers and scholars, but also others who gained their expertise through study and experience. In addition to providing data on different types of individuals, these data sets represent knowledge generation at different scales. Authoring a research article or patent in most cases involves weeks to years of research, culminating in a significant new result worthy of publication. In contrast, contributing a fact to *Wikipedia* or answering a question posed in an online forum may involve little more than a simple recall of previously attained knowledge — and a few minutes of the contributor’s time.

In evaluating focus across such a broad range of activities, we aimed to use a metric that captures three qualities: *variety*, or how many different areas an individual contributes to; *balance*, or how evenly their efforts are distributed among these areas; and, *similarity*, or how

related those areas are (Rafols and Meyer, 2010). We use the Stirling measure \mathcal{F} , which captures all three aspects (Stirling, 2007):

$$\mathcal{F} := \sum_{i,j} s_{ij} p_i p_j,$$

where p_i is the proportion of the individual's contributions in category i and $s_{ij} = n_{ij}/n_j$ is a measure of similarity between categories i and j , inferred from the number of joint contributors n_{ij} between two categories i and j . This metric assigns a narrower (higher) focus value to an individual who contributes to fewer, related areas than to someone who contributes in many unrelated areas.

The categories across which focus is measured differ by the type of knowledge-sharing medium. An inventor's proportion p_c of contributions in subject c is proportional to the number of times the class c is assigned by the inventor or patent examiner to the inventor's patents. Articles in the APS data set are classified according to the Physics and Astronomy Classification Scheme. For JSTOR articles, in the absence of a pre-defined category structure, we used unsupervised topic models on the full text of authors' research articles (Blei, *et al.*, 2003). *Wikipedia* articles are situated within *Wikipedia*'s category hierarchy, while answers provided in Q&A forums are sorted according to the hierarchy of categories of the corresponding questions.

For each data set, we sought a relevant, objective measure of quality of a contribution and evaluated it in the context of its peers. For research articles, we measured each article's citation count relative to those of other articles in the same discipline and year (Valderas, *et al.*, 2007). Likewise, patents' citation counts were compared with those of other patents in the same patent classes and years. In doing this, we control for discipline-specific factors that can impact a publication's citation count such as publication cycle length and number of publications in the discipline (Stringer, *et al.*, 2008; Seglen, 1997). For *Wikipedia* contributions, we consider the percentage of words an author newly introduces to an article that survive subsequent revisions (Adler and de Alfaro, 2007). Finally, for Q&A forums, we rely on the asker's rating of answers: a good contributor should have their answer selected as best more often than expected by chance.

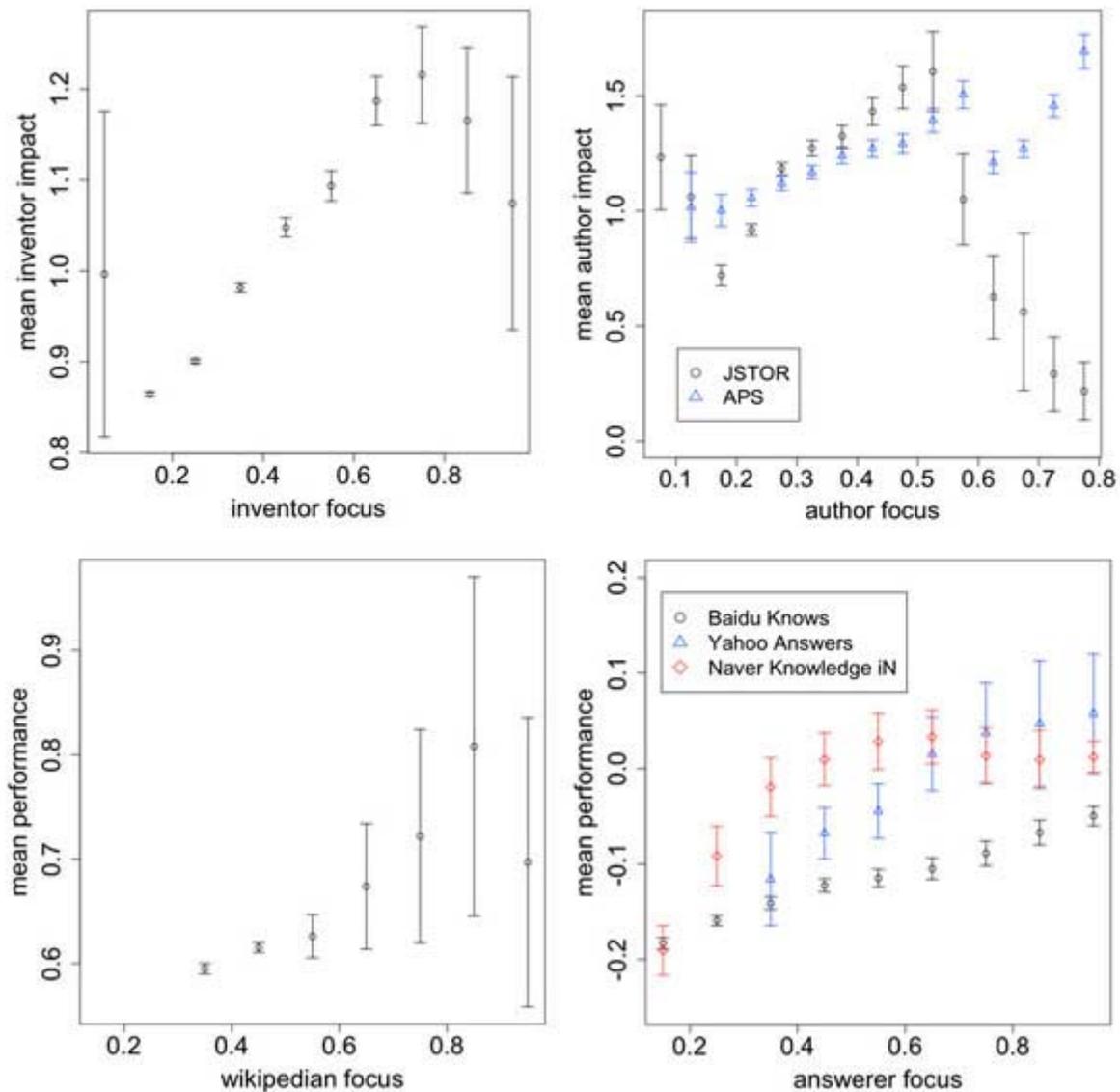


Figure 1: Mean quality as a function of focus of contribution.

Using these measures of focus and quality, we find that focus is weakly yet consistently positively correlated with quality across all types of knowledge contribution systems, as summarized in Table 1. The relationship between focus and quality is detailed further in Figure 1, which shows the variation in average quality for individuals grouped by their levels of focus. As focus increases, so does average quality; but the trend levels off or even reverses for extremely focused individuals. This is clarified by plotting average focus at a given level of quality (see Figure 2). While high-quality contributors are more narrowly focused than others on average, very poor contributors sometimes also dwell in a single area. In Q&A forums, we find further that narrowly focused users with poor track records of giving best answers tend to give answers that are significantly shorter than those of other users.

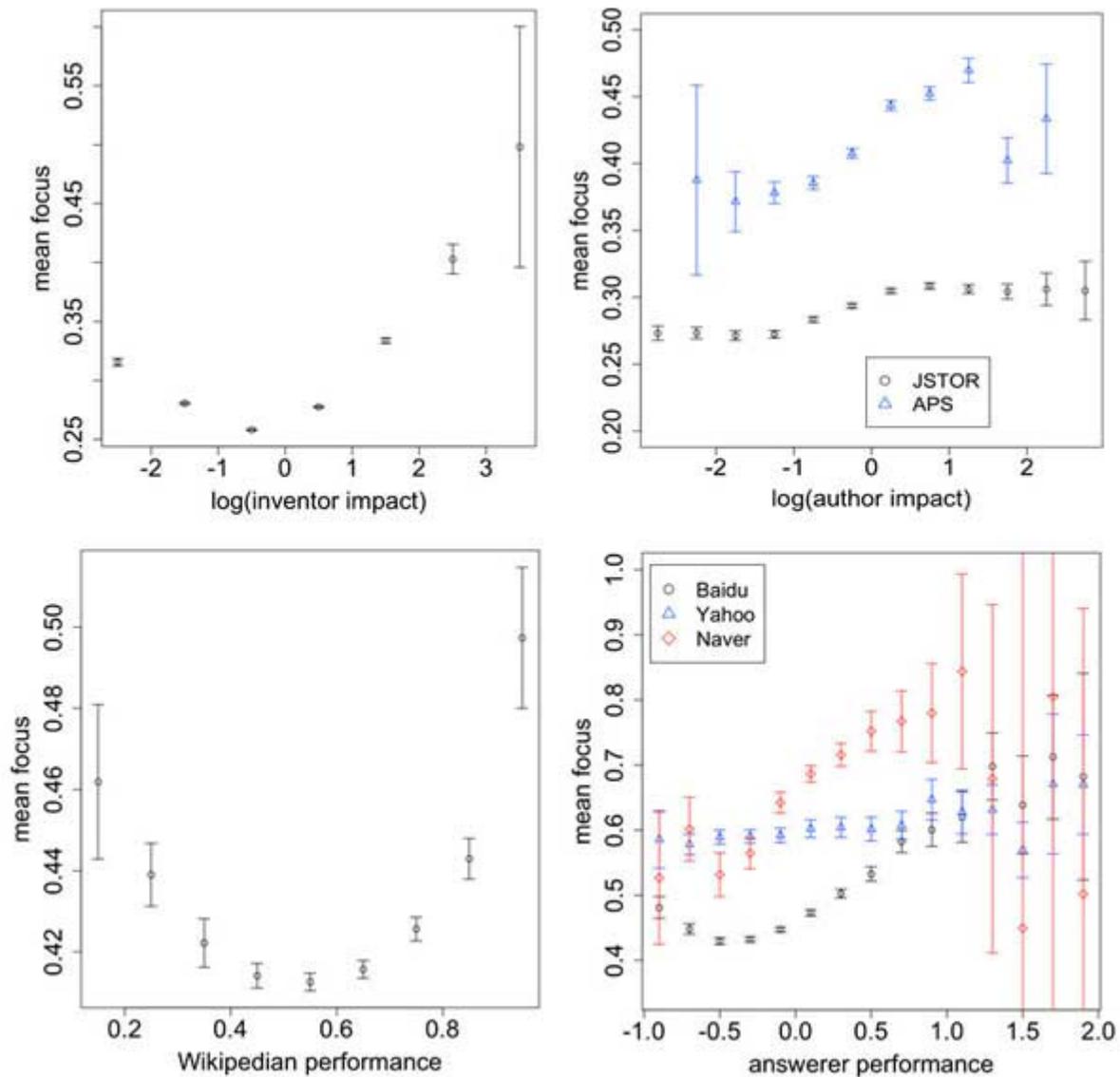


Figure 2: Mean focus as a function of quality of contribution.

We note that these data sets provide incomplete views of contributors' activity. JSTOR archives over a thousand journals, but does not include many more. Inventors' patents prior to 1976 are not captured in our data. Likewise, we parsed only a subset of the *Wikipedia* revision history; and, while our Yahoo Answers (YA) data set spanned the complete activity of a sample of users, our Baidu and Naver data sets covered only several months each.

Table 1: Pearson correlation between quantity, focus, and quality.

Note: All correlations are significant at $p < 0.001$.

Type	ρ (log	ρ (log	ρ (focus,
------	-------------	-------------	----------------

	(quantity), focus)	(quantity), quality)	quality)
Research articles JSTOR	-0.055	0.058	0.112
Research articles APS	0.302	0.130	0.173
Patents	0.286	0.100	0.094
<i>Wikipedia</i>	-0.274	0.133	0.084
Yahoo Answers	0.150	0.116	0.084
Baidu Knows	0.095	0.083	0.111
Naver KnowledgeIn	0.066	0.102	0.169

Nevertheless, we believe our results to be robust. We expect that we would find equally strong or stronger correlation between focus and quality, if we had complete records of each individual's contributions. An indication of this is that the correlations between focus and quality strengthen for individuals for whom we observe a higher number of contributions. For example, the correlation between focus and impact for inventors with 10–20 patents is just 0.079 ± 0.003 , but for inventors with 50 to 100 patents it increases to 0.166 ± 0.014 . Similarly, *Wikipedia* users editing between 10 and 20 pages display a correlation of 0.088 ± 0.065 , while those editing between 50 and 100 pages display a correlation of 0.243 ± 0.038 .

We find our results to be robust in several other respects as well. Aside from being consistent across a wide range of media and performance metrics, our results hold when focus is measured at different levels of granularity, *e.g.*, when using top-level patent, *Wikipedia*, and Q&A categories as opposed to subcategories in those data sets, and when we construct 250 as opposed to 100 topics in the JSTOR data set. While the distribution of focus shifts downward as we increase the granularity, the correlations between focus and other variables remain qualitatively similar.

Table 2: Pearson correlations between quality, focus, and quantity, when self-citations are removed. Note: All correlations are significant at $\rho < 0.001$.		
Type	ρ (log (quantity), quality)	ρ (focus, quality)
Research articles JSTOR	0.051	0.095
Research articles APS	0.059	0.036
Patents	0.059	0.073

We also find our results to be consistent, though weaker for the paper and patent data sets, when self-citations, *i.e.*, citations between two papers that share an author with the same last name, are removed. Table 2 summarizes these findings. Self-citations may inflate the impact of prolific and focused authors who have greater opportunity and justification to cite their own work. We also find consistent results using alternative focus measures such as Shannon Entropy, $-\sum_i p_i \ln(p_i)$. Entropy captures the balance and variety of contribution, but not similarity, and is negatively correlated with focus. We find the results to be qualitatively consistent to those obtained using the Stirling measure. Table 3 and Figures 3 and 4 correspond to Table 1 and Figures 1 and 2 respectively, but present results using contributor entropy rather than focus.

One remaining concern is that focus and quality are both correlated with a third variable that holds greater explanatory power. One such potential variable is that of quantity. Quantity itself is positively correlated with quality, revealing a possible link between contributor success and motivation or resources. However, focus remains a significant factor in the quality of contributions, even once quantity is accounted for (see Table 4). We also note that quantity's correlation with focus varies by medium studied, as shown in Table 1. The correlation is positive for patents and Q&A forums, but negative for research and *Wikipedia* articles. Individuals generating many patents or answers tend to focus their contributions more narrowly, but authors who write a greater number of research and *Wikipedia* articles tend to make broader contributions.

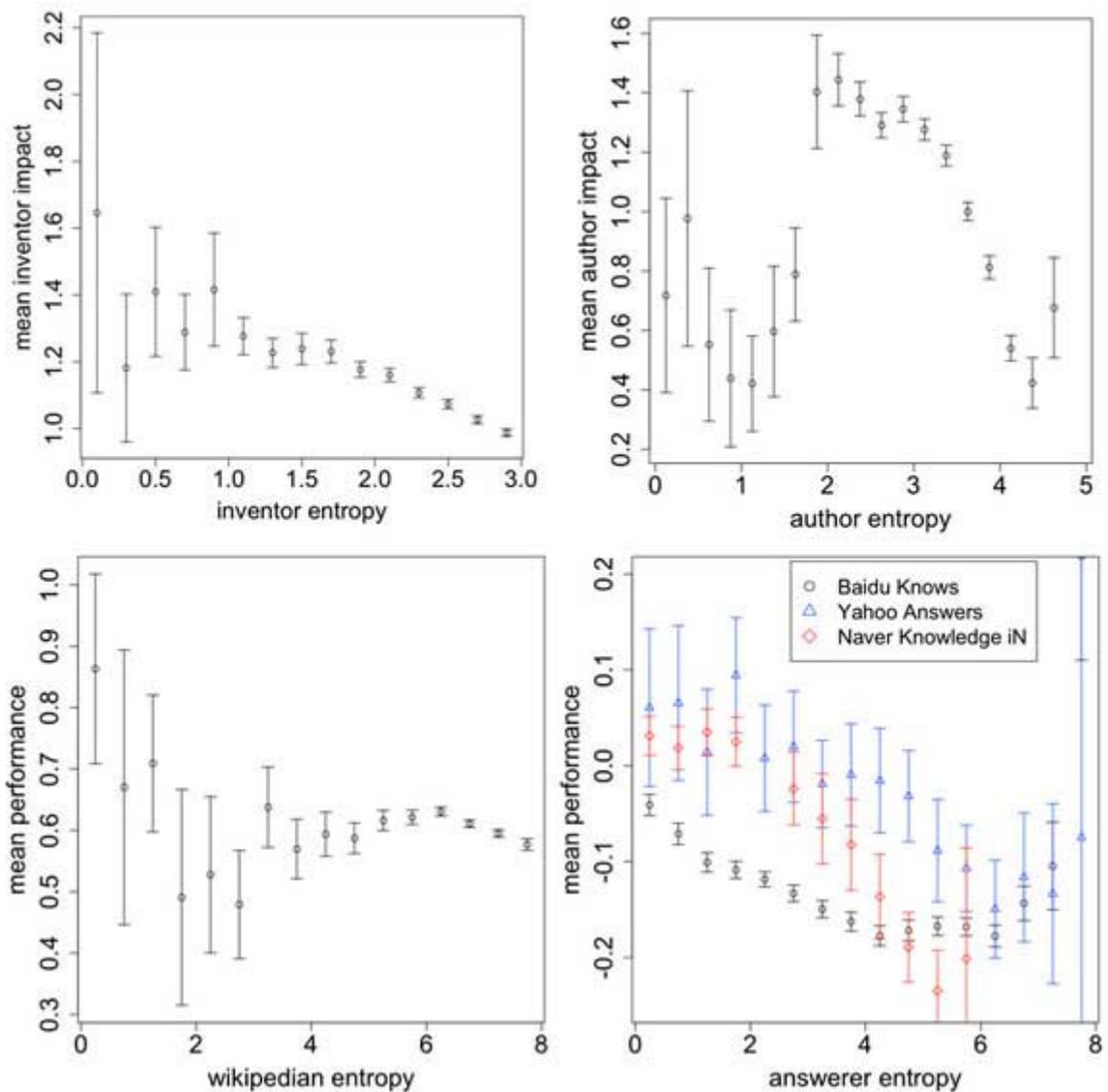


Figure 3: Mean quality as a function of entropy of contribution.

Table 3: Pearson correlations between focus, entropy, quantity, and quality. Note: All correlations are significant at $p < 0.001$.			
Data set	ρ (entropy, focus)	ρ (log (quantity), entropy)	ρ (entropy, quality)

Research articles JSTOR	-0.606	0.082	-0.218
Research articles APS	-0.601	0.083	-0.116
Patents	-0.848	0.160	-0.117
<i>Wikipedia</i>	-0.755	0.629	-0.103
Yahoo Answers	-0.878	-0.081	-0.121
Baidu Knows	-0.918	-0.034	-0.108
Naver KnowledgeIn	-0.946	-0.175	-0.223

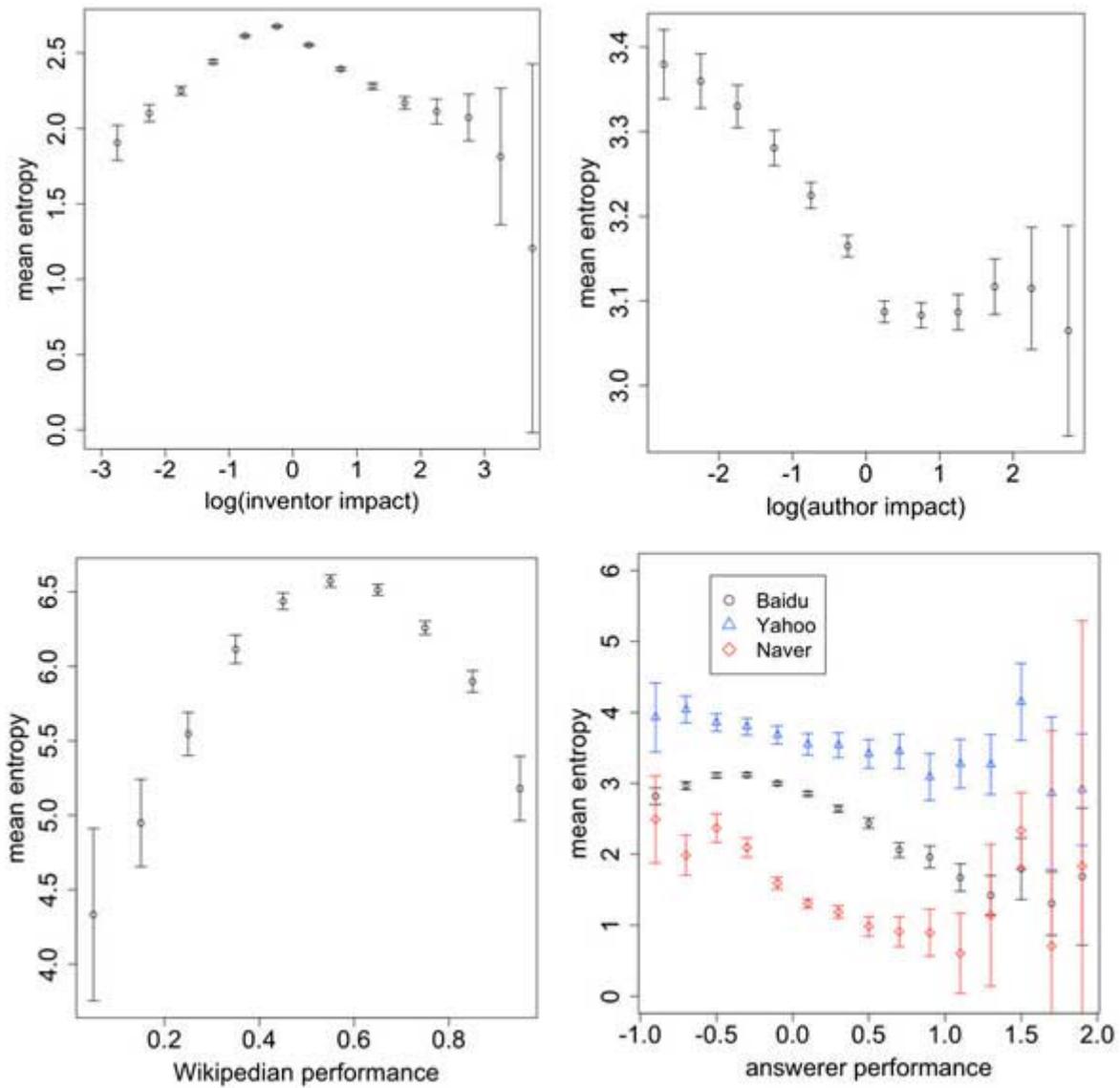


Figure 4: Mean entropy as a function of quality of contribution.

Table 4: Regression models using quantity and focus as predictors of quality.							
Variable	JSTOR	APS	Patents	Wikipedia	YA	Baidu	Naver
focus	1.899*** (0.085)	0.553*** (0.040)	0.501*** (0.009)	0.353*** (0.033)	0.245*** (0.046)	0.143*** (0.005)	0.146*** (0.015)
log (quantity)	0.177*** (0.014)	0.124*** (0.008)	0.163*** (0.003)	0.027*** (0.002)	0.046*** (0.005)	0.052*** (0.002)	0.039*** (0.008)

R^2	0.017	0.025	0.015	0.023	0.022	0.023	0.022
-------	-------	-------	-------	-------	-------	-------	-------

Finally we examine whether individuals narrow or broaden their focus over time. For JSTOR research articles, patents, and Q&A forums, a majority of contributors narrow their focus over time (see Table 5). *Wikipedia* contributors and physicists, on the other hand, do not appear to specialize further. In addition to a change in focus, we also observe a slight change in quality. Across most data sets, contributors tend to improve in quality over time; exceptions include Baidu Knows, where the change in answer quality is not significant, and JSTOR, where there is a statistically significant decline in contribution quality. One might speculate that a researcher's early success permits him or her to continue producing publications, but that the quality of those publications may fall due to factors such as moving from a primary contributor to a project management role.

Table 5: Change in focus from first half to second half of contributions.			
Data set	% who increased focus	av. change focus	av. change quality
Research articles JSTOR	62.0%	0.024	-0.394
Research articles APS	44.0%	-0.012	-0.157
Patents	79.5%	0.139	0.080
<i>Wikipedia</i>	49.5%	not. sig.	0.066
Yahoo Answers	69.8%	0.056	0.056
Baidu Knows	61.4%	0.040	not. sig.
Naver KnowledgeIn	68.8%	0.023	0.034



Discussion

We have quantified the value an individual's focus in contributing knowledge through both traditional and online media and across a wide range of subjects. Consistently we observe a slight but significant correlation between an individual's degree of focus and this individual's quality of contribution. The relationship persists even when quantity of contributions is taken into account.

How should individuals invest their time? While our results do not demonstrate causality, the overall trend appears to favor those who do a few things and do them well. However, individuals who focus in a very narrow field tend to contribute work that is on average less well recognized than that of their slightly less focused peers.

This work immediately suggests several areas for future research. It would be useful to understand the benefit of narrowing one's focus in the context of the specific domain and knowledge sharing medium, in addition to the quality and diversity of one's prior efforts. One could also examine whether novel, groundbreaking contributions are made by more or less narrowly focused individuals, and whether editorial tasks, important in the context of online collaborative media such as *Wikipedia*, benefit from a breadth of expertise.

In addition, while these results have shed light on the value of focus in the context of the individual, they say nothing about focus in the context of a group. After all, several studies have demonstrated the value of interdisciplinary collaborations in the sciences, and we believe that large-scale online knowledge sharing systems such as those discussed are successful precisely because they bring together individuals of different backgrounds. This leaves open the question of whether collaborations between more *individually focused* — yet *collectively diverse* — individuals are more fruitful.



Materials and methods

Table 6 summarizes the data sets we used to study focus and contribution. For each data set we selected a threshold criterion for the minimum level of activity needed for an individual to be included.

Table 6: Description of data.			
Data set	Time span	No. individuals	Threshold no. contributions
JSTOR	1668–2006	37,031	10 articles
APS	1977–2006	22,351	10 articles
Patents	1976–2006	604,113	10 patents
<i>Wikipedia</i>	2001–2006	7,129	40 edits
Yahoo Answers	08/05–03/09	5,256	40 answers
Baidu Knows	12/07–05/08	65,854	40 answers
Naver KnowledgeIn	12/08–02/09	5,918	40 answers

Research articles. A snapshot of JSTOR data includes two million research articles with 6.6 million citations between them. JSTOR spans over a century of publications in the natural and social sciences, the arts, and humanities. For this data set, we needed to address name ambiguity. For example there were 26,000 instances where a person with the last name of Smith authored an article and 728 unique combinations of initials appearing alongside “Smith”. Identifying two different individuals as being one and the same would tend to introduce data points with low focus and an inflated number of articles. Since both variables are related to quality, we sought to exclude such instances. We excluded authors with

$\sqrt{F_L * L_F} > 200$, where F_L is the number of first names or initials the inventor’s last name occurs with in the data set, and L_F is the number of last names the inventor’s first name occurs with. We also collapsed matching names and initials if there was only one matching first name/initial pair and the last name occurred with fewer than 50 first names. This left us with 37,031 authors with 10 or more publications, for whom we were reasonably sure that they were uniquely identified.

Using latent dirichlet allocation (Blei, *et al.*, 2003), we generate 100 topics over the entire corpus of research articles. Each document was assigned a normalized score for each of the 100 topics, and the pairwise topic similarity matrix s was computed from cosines of vector values across documents. An author’s distribution across topics was computed by averaging the topic vectors of all of the articles they authored. For robustness, we repeated the analysis with 250 topics instead of 100, and found quantitatively similar correlation between focus and quality, although focus scores were lower due to the finer granularity. The quality of an article is measured as the number of times the article is cited, divided by the number of times other articles in the same area and year are cited. Citations originate within the data set. By normalizing quality by area, we mitigate the possible biases introduced by some areas being better represented in the data set than others.

Our database of American Physical Society publications included *Physical Review Letters*, and *Physical Review A–E* journal articles. We excluded *Reviews of Modern Physics* as we were considering the impact of original research rather than review articles. The data set contained 396,134 articles published between 1893 and 2006, with 3,112,706 citations between them. For our purposes, we were limited to the 261,161 articles with PACS (Physics and Astronomy Classification Scheme) codes associated with articles published after 1977. The PACS hierarchy has five levels, and we performed our analysis at the level of the 76 main categories, such as 42 (Optics) and the 859 2nd level categories, e.g., 42.50 (Quantum Optics).

Patents. The patent data set contains all 5,529,055 patents filed between 1976 and 2006, in 468 top level categories. We construct a similarity matrix for the 468 categories, reflecting the frequency with which inventors in one category also file patents in another. There are 3,643,520 patents citing 2,382,334 others, for a total of 44,556,087 citations. We excluded inventors with $\sqrt{F_L * L_F} > 150$. This makes it unlikely that we would identify two separate individuals as being one. We measure an inventor’s impact according to a citation count normalized by the average number of citations for other patents in the same year and categories as those filed by the inventor.

Q&A forums: We obtained snapshots of activity on Q&A forums with uniquely identified users posting answers to questions in distinct categories. We perform our analysis at the subcategory level, which gives us enough resolution to differentiate the question topics, while supplying a sufficient number of observations in each subcategory. We use best answers as a proxy for

answer quality. The best answer is selected by the user who posed the question. If this user does not select a best answer, it may be selected via a vote by other users. The quality metric we used was the γ score (Nam, *et al.*, 2009), which compares the number of answers the user gives that were selected as best among others, relative to the expected number of best answers. $\gamma = (\text{observed} - b_e)/b_e$. b_e , the expected number of best answers is simply given by $b_e = \sum_k 1/a_k$, where a_k is the total number of users answering question k .

Wikipedia: Our *Wikipedia* data set is a meta–history dump file of the English *Wikipedia* generated on 4 November 2006. The dump file has the entire revision history of about 1.5 million encyclopedia pages, of which we parsed 100,000, or about seven percent. In order to verify that our sample is unbiased with respect to topic distribution, we compare the category and subcategory distributions of our sample to that of a larger corpus of one million pages. The two distributions have a nearly perfect correlation ($\rho < 0.96^{***}$).

Articles are a product of varying number of revisions, from several to 10,000 for single article. Revisions are contributed by either registered or anonymous users. Since anonymous users' revision histories are non–traceable, we only consider registered users whose unique user names are associated with at least 40 revisions. We excluded *Wikipedia* administrators from our study because they may perform a primarily editorial role. In like manner, to better filter the noise of measuring the quality of words by the final version of articles, we only choose pages in which fewer than five percent of the revisions occurred in the 30 days prior to the data dump.

A *Wikipedia* contributor's focus and entropy were calculated from the second–level categories of the pages they edit. Each *Wikipedia* article belongs to one or more categories. We truncated each hierarchical category to one of the roughly 500 second–level categories.

The quality of a contribution is measured in terms of w_{new} , the number of new words added by a user to *Wikipedia* articles, such that the words were not present in any previous revisions of those articles. We found a high correlation between the number of new words that survive five revisions, and the number w_{surv} that survive to the last revision of the article ($\rho > 0.97^{***}$), consistent with previous analyses of edit persistence (Panciera, *et al.*, 2009). We therefore constructed a simple metric by taking the proportion of new words introduced by the user that are retained in the last version of a sufficiently frequently edited article: w_{surv}/w_{new} (Adler and de Alfaro, 2007). 

About the author

Lada A. Adamic is an assistant professor in the School of Information and the Center for the Study of Complex Systems at the University of Michigan.

E–mail: ladamic [at] umich [dot] edu

Xiao Wei is a masters student and research assistant, School of Information, University of Michigan.

E–mail: xiaowei [at] umich [dot] edu

Jiang Yang is a PhD candidate, School of Information, University of Michigan.
E-mail: yangjian [at] umich [dot] edu

Sean Gerrish is a PhD candidate, Department of Computer Science, Princeton University.
E-mail: sgerris [at] cs [dot] princeton [dot] edu

Kevin K. Nam is a PhD candidate, School of Information, University of Michigan.
E-mail: ksnam [at] umich [dot] edu

Gavin S. Clarkson is an associate professor at the University of Houston Law Center and the Institute for Intellectual Property & Information Law.
E-mail: gclark [at] uh [dot] edu

Acknowledgments

We thank IBM for providing the patent data, and JSTOR, APS, and Katy Borner for providing the article citation data. We would also like to thank Michael McQuaid, Jure Leskovec, Scott Page and Eytan Adar for helpful comments. This research was supported by MURI award FA9550-08-1-0265 from the Air Force Office of Scientific Research and NSF award IIS 0855352.

References

Lada A. Adamic, Jun Zhang, Eytan Bakshy, and Mark S. Ackerman, 2008. "Knowledge sharing and Yahoo Answers: Everyone knows something," *WWW '08: Proceedings of the 17th International Conference on World Wide Web*, New York: ACM, pp. 665–674.

B. Thomas Adler and Luca de Alfaro, 2007. "A content-driven reputation system for the Wikipedia," *WWW '07: Proceedings of the 16th International Conference on World Wide Web*, New York: ACM, pp. 261–270.

David M. Blei, Andrew Y. Ng, and Michael I. Jordan, 2003. "Latent dirichlet allocation," *Journal of Machine Learning Research*, volume 3, pp. 993–1,022.

Roger Guimerà, Brian Uzzi, Jarrett Spiro, and Luis A. Nunes Amaral, 2005. "Team assembly mechanisms determine collaboration network structure and team performance," *Science*, volume 308, number 5722, pp. 697–702.

Benjamin F. Jones, Stefan Wuchty, and Brian Uzzi, 2008. "Multi-university research teams: Shifting impact, geography, and stratification in science," *Science*, volume 322, number 5905, pp. 1,259–1,262.

J.S. Katz and Diana Hicks, 1997. "How much is a collaboration worth? A calibrated bibliometric model," *Scientometrics*, volume 40, number 3, pp. 541–554.

Kevin Kyung Nam, Mark S. Ackerman, and Lada A. Adamic, 2009. "Questions in, knowledge in? A study of Naver's question answering community," *CHI '09: Proceedings of the 27th*

International Conference on Human Factors in Computing Systems, New York: ACM, pp. 779–788.

Scott E. Page, 2007. *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton, N.J.: Princeton University Press.

Katherine Panciera, Aaron Halfaker, and Loren Terveen, 2009. “Wikipedians are born, not made: A study of power editors on Wikipedia,” *GROUP '09: Proceedings of the ACM 2009 International Conference on Supporting Group Work*, New York: ACM, pp. 51–60.

Ismael Rafols and Martin Meyer, 2010. “Diversity and network coherence as indicators of interdisciplinarity: Case studies in bionanoscience,” *Scientometrics*, volume 82, number 2, pp. 263–287.

Per O. Seglen, 1997. “Why the impact factor of journals should not be used for evaluating research,” *British Medical Journal*, volume 314, number 7079, p. 497.

Andy Stirling, 2007. “A general framework for analysing diversity in science, technology and society,” *Interface: Journal of the Royal Society*, volume 4, number 15, pp. 707–719, at <http://rsif.royalsocietypublishing.org/content/4/15/707.full>, accessed 22 February 2010.

Michael J. Stringer, Marta Sales–Pardo, and Luís A. Nunes Amaral, 2008. “Effectiveness of journal ranking schemes as a tool for locating information,” *PLoS ONE*, volume 3, number 2, at <http://www.plosone.org/>, accessed 22 February 2010.

Philip E. Tetlock, 2005. *Expert political judgment: How good is it? How can we know?* Princeton, N.J.: Princeton University Press.

Jose M. Valderas, R. Alexander Bentley, Ralf Buckley, K. Brad Wray, Stefan Wuchty, Benjamin F. Jones, and Brian Uzzi, 2007. “Why do team–authored papers get cited more?” *Science*, volume 317, number 5844, pp. 1,496–1,498.

Stefan Wuchty, Benjamin F. Jones, and Brian Uzzi, 2007. “The increasing dominance of teams in production of knowledge,” *Science*, volume 316, number 5827, pp. 1,036–1,039.

Jiang Yang and Xiao Wei, 2009. “Seeking and offering expertise across categories: A sustainable mechanism works for Baidu Knows,” *Proceedings of International AAAI Conference on Weblogs and Social Media*, at <http://aaai.org/ocs/index.php/ICWSM/09/paper/view/175>, accessed 22 February 2010.

Editorial history

Paper received 9 February 2010; accepted 22 February 2010.



“Individual focus and knowledge contribution” by Lada A. Adamic, Xiao Wei, Jiang Yang, Sean Gerrish, and Gavin S. Clarkson is licensed under a Creative Commons Attribution 3.0 United States License.

Individual focus and knowledge contribution

by Lada A. Adamic, Xiao Wei, Jiang Yang, Sean Gerrish, Kevin K. Nam, and Gavin S. Clarkson.

First Monday, Volume 15, Number 3 - 1 March 2010

<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2841/2475>

How today's college students use *Wikipedia* for course-related research

by Alison J. Head and
Michael B. Eisenberg

Abstract

Findings are reported from student focus groups and a large-scale survey about how and why students (enrolled at six different U.S. colleges) use *Wikipedia* during the course-related research process. A majority of respondents frequently used *Wikipedia* for background information, but less often than they used other common resources, such as course readings and Google. Architecture, engineering, and science majors were more likely to use *Wikipedia* for course-related research than respondents in other majors. The findings suggest *Wikipedia* is used in combination with other information resources. *Wikipedia* meets the needs of college students because it offers a mixture of coverage, currency, convenience, and comprehensibility in a world where credibility is less of a given or an expectation from today's students.

Contents

Introduction
Methods
Results
Discussion
Conclusion

Introduction

Want to stir up a room full of college faculty and librarians?

Mention *Wikipedia*.

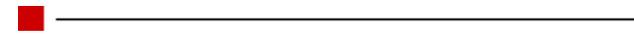
Wikipedia, the online, peer-produced encyclopedia, is one of the most discussed topics on campuses today. Much of the academic debate turns on issues about *Wikipedia's* reliability, completeness, accuracy, and intellectual rigor and whether college student should, or should not, use the collectively produced encyclopedia for course-related research assignments [1].

Yet at the same time, very little is known about how and why today's college students actually use *Wikipedia* during the course-related research process.

In this paper, we present findings from a survey of U.S. college students on six campuses during the spring of 2009.

We investigated the use of *Wikipedia* for course-related research in five related areas:

1. How frequently college students use *Wikipedia*.
2. What motivates students to use *Wikipedia*.
3. At which stages of research students use *Wikipedia*.
4. How *Wikipedia* is used in relation to other information resources.
5. What predictors reveal which types of students are more and less likely to use *Wikipedia*.



Methods

The findings reported in this paper are part of Project Information Literacy (PIL), an ongoing national research study, based in the University of Washington's Information School [2].

We conducted the research about *Wikipedia* usage in two phases during 2008 and 2009.

Phase 1: Student focus groups

The PIL team conducted 11 student focus groups on seven campuses in the U.S between October and December 2008 [3]. On average, each session was 90 minutes long.

The student focus groups provided qualitative data about students' research habits, behaviors, experiences, and the obstacles that they encountered. A segment of the sessions focused on course-related research and how students used *Wikipedia*.

We define course-related research in broad terms — from the moment students receive a research assignment through collecting and evaluating materials until the final writing of a mid-course paper (e.g., five-eight pages).

In total, 86 students participated in the sessions. Far more females (70 percent) than males participated in the focus groups [4].

Participants ranged in age from 20 to 30 years old. Students were full-time sophomores, juniors, seniors from four-year public and private colleges and universities, and full-time community college students, who had completed at least one semester at the institution [5].

The focus group sample consisted primarily of students in the humanities or social sciences. This group of students, we assumed, was likely to be acquainted with secondary research methods [6].

The mean GPA for the total student sample across all seven schools was 3.44, or just above a B+ average.

Phase 2: Student survey

A survey was distributed to 27,666 students on six campuses in the U.S. between April and May 2009. The study sample was 2,318 responses. The overall response rate was eight percent.

The 32-item survey was administered online, using survey software provided through the University of Washington.

Surveys were sent to students' e-mail addresses, which were provided through each school's Registrar's Office [7]. The survey instrument underwent a Human Subjects Division review at each participating institution.

The purpose of the survey was to collect data about information needs and behaviors of respondents during course-related and everyday life research. The survey instrument was informed with qualitative data from the student focus groups in Phase 1.

We sampled students studying in all major disciplinary areas (*i.e.*, humanities, social sciences, sciences, education, engineering, business, and occupational training) [8].

The survey sample consisted of sophomores, juniors, or seniors at four-year institutions ($n=1,627$) and full-time students who had taken 12 units at the community college at which they were enrolled ($n=691$) [9].

More females (65 percent) than males (35 percent) took the survey. The mean grade point average (GPA) for the total student sample across all six schools was 3.4, or a B+ average [10].

We used PASW (Version 17.0) as a statistical tool for calculating frequencies, cross tabulations, and logistic regressions.

We acknowledge that our findings are not generalizable to the full student college population. However, our analysis of *Wikipedia* use does show consistent responses and fairly robust relationships among variables from a large sample of students at six separate educational institutions in the U.S.



Results

Major findings from the study are as follows:

1. Far more students, than not, used *Wikipedia*. *Wikipedia* was used in addition to a small set of other commonly used information resources at the beginning of the research process.
2. Reasons for using *Wikipedia* were diverse: *Wikipedia* provided students with a summary about a topic, the meaning of related terms, and also got students started on their research and offered a usable interface.

3. Respondents who were majoring in architecture, engineering, or the sciences were more likely to use *Wikipedia* than respondents in other majors [11].

Using *Wikipedia*

The signature research assignment for humanities and social sciences courses is the argument paper (67 percent). These papers entail choosing a topic, defining an issue, and taking a position backed by evidence culled from secondary resources (e.g., books, journals, and resources found on the Internet).

To a lesser degree, students reported conducting “outside research” for other course–related assignments that were interpretative readings of a text (53 percent), historical analyses (39 percent), and literature reviews (38 percent).

Over half of the survey respondents (52 percent) were frequent *Wikipedia* users — even if an instructor advised against it [12]. Students reported that they frequently, if not always, consulted *Wikipedia* at some point during their course–related research (see Figure 1).

Far fewer of the respondents (22 percent) reported that they rarely, if ever, used *Wikipedia*.

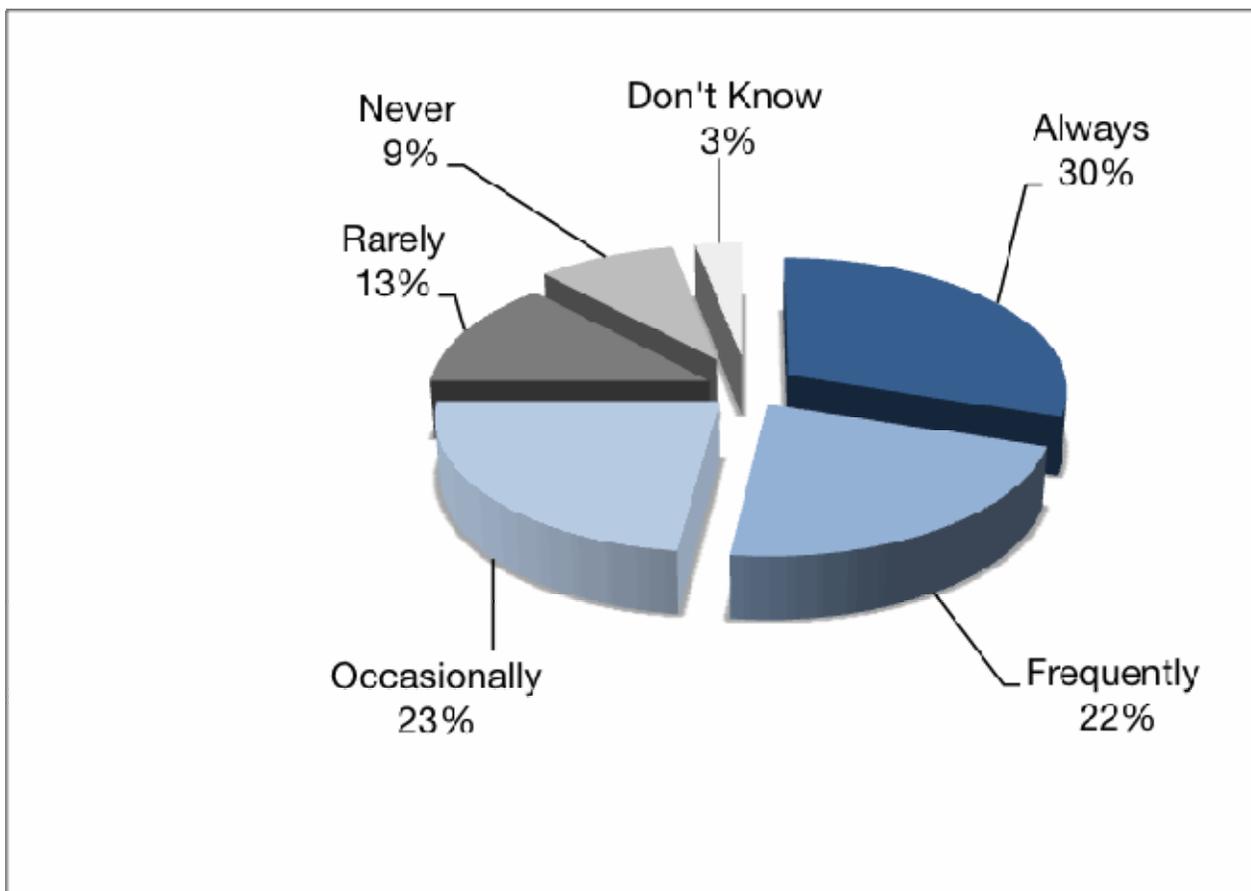


Figure 1: How often do students use *Wikipedia* during the course–related research process?

Why *Wikipedia*?

Students used *Wikipedia* for a variety of reasons. More than any other reason, 8 in 10 survey respondents (82 percent) reported that they went to *Wikipedia* to obtain background information or a summary about a topic (see Figure 2).

Wikipedia clearly has value to students as a workaround for previewing a topic. As one student in our sessions simply said, “*Wikipedia* tells me what’s what.”

Respondents also reported that they turned to *Wikipedia* because it: (1) helped them get started (76 percent); (2) featured an easy to use interface (69 percent); and, (3) helped them find the meaning of terms and use of language used about certain topics (67 percent).

Wikipedia’s greatest value to students may be its ability to alleviate common frustrations students initially have with conducting research [13]. Some students in our focus sessions described a vicious cycle during the research process from the outset.

Students reported they could not begin their research process until they had an idea of what they were going to write about. They did not think that they could approach an instructor about an assignment, until they knew more about their topic. They did not use a scholarly research database early on, given the specificity of academic journal content.

Wikipedia was a convenient go-to source under these circumstances. The source delivered results students could act upon, allowing them to get unstuck and move forward.

To a slightly lesser degree, respondents used *Wikipedia* because the entries were easy to understand (64 percent), entries included hypertexted citations (54 percent), entries helped students figure out search terms (44 percent), or because entries had current, up-to-the-minute information (39 percent).

Fewer students in the sample used *Wikipedia* because they thought *Wikipedia* was more credible than other Web sites (17 percent). In addition, the wiki software, which allows for massively distributed collaboration, did little to drive student traffic. Few respondents (16 percent) considered shared authorship capabilities as a reason for use.

As a whole, the findings suggest that students used *Wikipedia* for its summaries and to get started, and because of usability, comprehensibility, and lesser so, for credibility or its peer-to-peer (*i.e.*, wiki) capabilities.

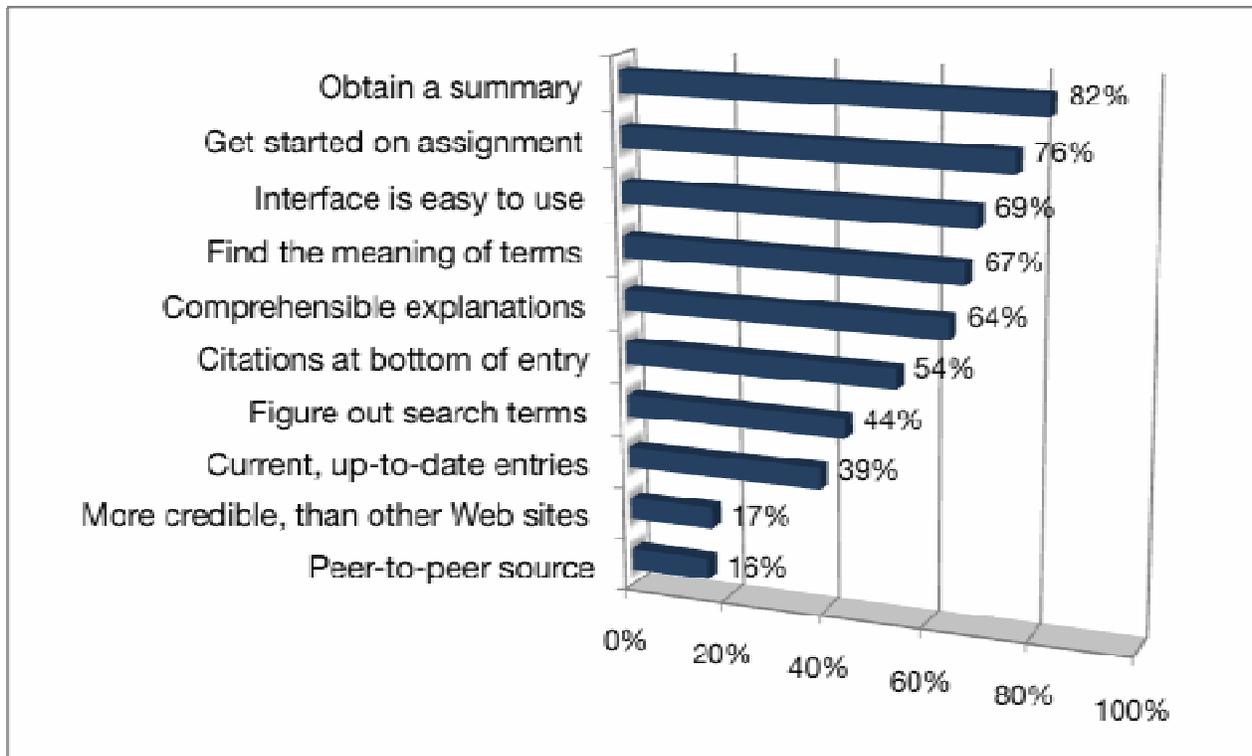


Figure 2: Why do students use *Wikipedia* for course-related research?

How *Wikipedia* fits into the research process

Most respondents (70 percent) reported using *Wikipedia* at the beginning of the research process (see Figure 3). Very few used *Wikipedia* near or at the end (two percent).

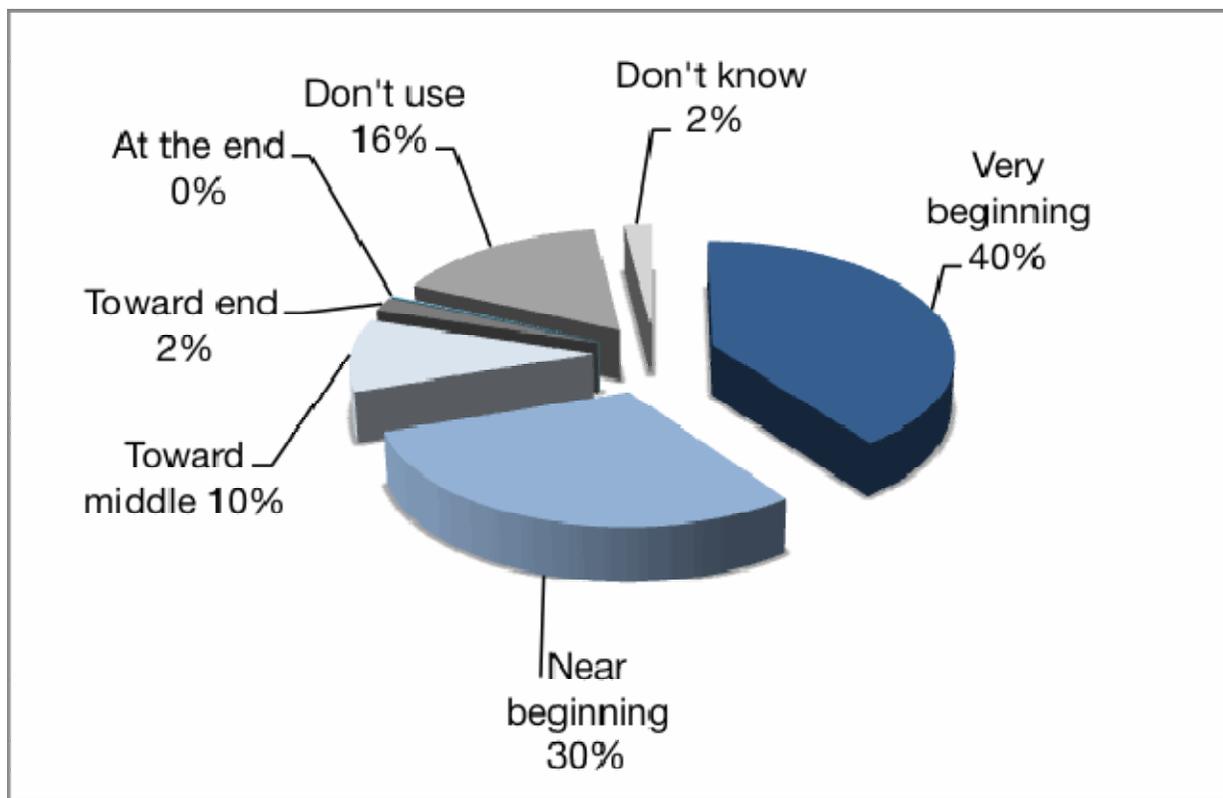


Figure 3: At which stage in the research process is *Wikipedia* used by students?

The survey results are consistent with accounts we heard in our student focus groups about when they use *Wikipedia*. Students in the focus group sessions were precise in characterizing *Wikipedia* as “a .5 step in my research process” or “the very beginning of the very beginning for me.”

Students in the sessions explained that *Wikipedia* entries have value in the beginning because they provide a “simple narrative that gives you a grasp,” “can point you in the right direction,” and “help when I have no idea what to do for a research paper.”

Another focus group participant called *Wikipedia* “my presearch tool.” Presearch, as the participant defined it, was the stage of research where students initially figure out a topic, find out about it, and delineate it.

As one student put it, *Wikipedia* is ideal for big-picture background “in good English” and “putting me in my comfort zone” before moving on to more serious research (*i.e.*, scholarly research databases and to a lesser degree, library books).

The large majority of students we interviewed said they begin with *Wikipedia* despite professors’ cautions about *Wikipedia* as an authoritative source. As a student in a focus group commented, “Sure, I use *Wikipedia* just to get a taste, even though my professors say not to.”

Most students also said they do not tell their professors they use *Wikipedia*; they simply avoid citing it in their reports. This was particularly true in the case of students in our sample enrolled in four-year institutions, who more likely to use *Wikipedia* than students in two-year institutions.

Few students in our sessions ended their course-related research with *Wikipedia*. As one student in the focus group sessions described, “My professor says *Wikipedia* is a great place to start, but a horrible place to end.”

Moreover, we found almost all of the respondents in our survey reported using an information strategy reliant on a small set of common information sources — close at hand, tried and true [14].

Students exhibited little inclination to vary the frequency or order of their use, regardless of where they were enrolled and despite all the online and in-person resources available to them.

Figure 4 presents a list of information resources used specifically for finding background during the course-related research process (listed from most to least used).

Figure 4: Which resources do students turn to for obtaining background about a topic? Note: Listed in descending order from most to least frequently used resources.	
Resources used for obtaining background about a topic	Frequency (% and N)
1. Course readings	97% 1,903
2. Google (<i>i.e.</i> , for finding sites other than <i>Wikipedia</i>)	95% 1,891
3. Scholarly research databases (EBSCO, ProQuest, JSTOR, etc.)	93% 1,823
4. Online Public Access Catalog (OPAC)	90% 1,791
5. Instructors	87% 1,662
6. <i>Wikipedia</i>	85% 1,675
7. Government Web sites	74% 1,381
8. Classmates	71% 1,362
9. Personal collection	69% 1,288
10. Library shelves	69% 1,312

11. Encyclopedias (print or online, e.g., <i>Britannica</i>)	61% 1,188
12. Friends	57% 1,088
13. Other search engines (e.g., Ask, Yahoo!)	52% 1,022
14. Librarians	45% 865
15. Blogs	25% 474

These findings suggest when students needed background information, they turned to course readings, Google, online scholarly databases, the library's online public access catalog (OPAC), and instructors — and less frequently to *Wikipedia* [15].

Who is likely to use *Wikipedia*?

We utilized a logistic regression to investigate which members in our sample were likely to be *Wikipedia* users.

Specifically, we examined the relationship of certain student characteristics (*i.e.*, institutional affiliation by two-year vs. four-year campus, major area of study, and information resource usage) with the likelihood that respondents would use *Wikipedia* for course-related research [16].

The results of the logistic regression and explanation appear in Figure 5.

Figure 5: Predicting the probability of using <i>Wikipedia</i> during course-related research.							
Note: Variable(s) entered on step 1: campus_dummy, architecture, arts, business, education, occupational, sciences, Google-di, cllibr_di, instructor_di, creading_di.							
	<i>B</i>	S.E.	<i>P</i>	Odds ratio	95% for C.I. odds ratio		Probability for using <i>Wikipedia</i>
					Lower	Upper	
* Dummy variable (two-year institution)	-1.23	.150	0	.29	.219	.394	22.48%
* Architecture and engineering majors	1.02	.288	0	2.77	1.578	4.878	73.47%

Arts and humanities majors	.262	.197	.184	1.30	.883	1.914	56.52%
Business majors	.455	.236	.054	1.58	.993	2.504	61.24%
Education majors	.59	.576	.303	1.81	.585	5.606	64.41%
Occupational training majors	.233	.219	.288	1.26	.822	1.939	55.75%
* Science majors	.625	.213	.003	1.87	1.232	2.834	65.16%
* Google usage	2.30	.225	0	10.01	6.435	15.562	90.92%
* Librarian usage	- 3.90	.140	.005	.677	.514	.891	40.37%
Instructor usage	.340	.191	.075	1.40	.966	2.044	58.33%
Course reading usage	.062	.305	.838	1.06	.586	1.933	51.46%
Constant	- 4.90	.372	.188	.613			

The model contained 11 independent variables in three general groupings: (1) two-year institutional enrollment; (2) majors in architecture and engineering, arts and humanities, business, education, occupational training, sciences, and social sciences (social sciences was the reference category); and, (3) information resources usage, including Google, librarians, instructors, or course readings [17], [18].

The model's dependent variable was "the use of *Wikipedia*." We determined use by students' response to a survey question about whether they used *Wikipedia* or not at some point during their course-related research process.

The full model containing all predictors of *Wikipedia* usage had a (Nagelkerke) R-squared value of 20 percent. In other words, 20 percent of all the variance in the use of *Wikipedia* can be accounted for by these variables, using this model.

As shown in Figure 5, five independent variables were associated with *Wikipedia* usage at a statistically significant (.05%) level. These variables appear bolded and asterisked in the first column of Figure 5.

Overall, the strongest predictor of using *Wikipedia* was being someone who also used Google for course-related research, with an estimated odds ratio of 10.00 or a probability of about 91 percent (controlling for all other factors in the model).

Two other predictors of *Wikipedia* usage were: (1) being an architecture or engineering major, with an estimated odds ratio of 2.77 or a probability of about 74 percent; and, (2) being a science major, with an estimated odds ratio of 1.87 or a probability of about 65 percent, compared to a social sciences major and everything else that is not explicitly included (controlling for all other factors in the model).

To a lesser extent, two more predictors of *Wikipedia* usage can be deduced from negative values reported in Figure 5. Respondents enrolled in two–year institutions were *less likely* than students in four–year institutions to use *Wikipedia*, with an estimated odds ratio of .32 or a probability of about 23 percent (controlling for all other factors in the model).

Respondents who used a librarian were *less likely* to use *Wikipedia* than those who don't, with an estimated odds ratio of .67 or a probability of about 23 percent (controlling for all other factors in the model).

In addition to the five statistically significant variables in our model, another six independent variables were not significantly associated (.05%) with the dependent variable.

Variables for which the odds ratio did not differ significantly from 1 (*i.e.*, a 50 percent chance that they would use *Wikipedia* and a 50 percent chance they would not) were students with majors in arts and humanities, business, education, occupational training and also the use of instructors or course readings for course–related research.

Overall, the predictors from our model about *Wikipedia* use are as follows:

1. Respondents who were Google users were 10 times more likely to use *Wikipedia* for course–related research than respondents who did not use Google (controlling for all other factors in our model).
2. Respondents majoring in architecture or engineering were almost three times more likely to be *Wikipedia* users, compared to social sciences majors (controlling for factors in our model). While respondents majoring in sciences were more than 1.5 times more likely to use *Wikipedia*, compared to social science majors (controlling for all other factors in the model).
3. Those enrolled in two–year campuses were *less likely* than those in four–year institutions to report that they used *Wikipedia*.
4. Those who consulted librarians were *less likely* to report using *Wikipedia* than those did not consult librarians.



Discussion

Few research studies have investigated how and why college students use *Wikipedia*.

The Pew Internet & American Life Project found that 50 percent of online users with a college diploma used *Wikipedia* to find information, based on a large–scale survey of U.S. residents (n=1,492) (Rainie and Tancer, 2007) [19]. The Pew researchers concluded that college students, and the “well educated,” were more likely to use *Wikipedia* than those with only a high school diploma.

A recent study surveyed a small sample of communication majors (n=134) and found more than a third (39 percent) of the sample reported being frequent *Wikipedia* users (*i.e.*, had used *Wikipedia* more than 15 times in the prior semester) (Lim, 2009) [20]. Students used *Wikipedia* for obtaining background information and checking facts, even though their perceptions about information quality were not high.

Our research findings substantiate these studies' earlier claims: Many students are indeed *Wikipedia* users; many use the site for background information.

Yet our research provides a snapshot of which students may be more likely to turn to *Wikipedia* than others, too.

Students majoring in architecture, engineering, or the sciences, compared to other majors in our model, were more likely to use *Wikipedia* than other students in our sample.

One explanation for these findings may be these majors, more than students in other disciplines, may need additional background for their paper assignments.

Argument papers, the bread and butter of humanities and social science courses, may be unfamiliar territory for them. And the resources needed to complete these assignments may be unknown to them, too.

We also found students enrolled in four-year institutions were more likely to use *Wikipedia* than students in our sample enrolled in two-year institutions (*i.e.*, community colleges).

This finding suggests respondents from two-year institutions may have received more hands-on training about how to conduct scholarly research than at four-year institutions, given the curriculum and accreditation requirements in community colleges.

The four Cs

In a larger sense, our study also examined how *Wikipedia* fits into overall course-related research process of college students.

In general, we found *Wikipedia* was used, but less so than other resources that students frequently turned to for background information. When students were looking for background context they went to course readings, Google, scholarly research databases, and OPACs, more often than *Wikipedia*.

The findings suggest *Wikipedia* plays a part, but *Wikipedia* does not drive this part of the student course-related research process. This finding may help dispel some worries and concerns academics have about *Wikipedia*'s omnipotence and its use as a solitary source of information.

In fact, we found that if a student uses *Wikipedia*, it is surgically and methodically applied; usually in the very beginning of the research process as a precursor to a more in-depth investigation of a topic.

Wikipedia plays an important role when students are formulating and defining a topic. But when students are in a deep research mode scholarly research, it is library databases, such as JSTOR and PsychINFO, for instance, that students use more frequently than *Wikipedia*.

As a whole, these findings suggest that course–related research is a complex and a multi–step process. Students consistently employ preferred problem–solving strategies for course–related research, based on efficiencies and using a mix of self–taught workarounds and some formally learned research methods.

All in all, *Wikipedia* has a unique *information utility*. We define information utility in terms of how useful a resource is to students, based on their needs, standards, and expectations [21].

Wikipedia's information utility is tied to four Cs it delivers — currency, coverage, comprehensibility, and convenience.

It is *Wikipedia*'s hyper currency combined with a sheer range of coverage that is brief and easy to understand and access that makes *Wikipedia* useful and distinct from so many other sources (e.g., *Encyclopedia Britannica*, both the online and offline versions) [22].

On any given day, *Wikipedia*'s breadth of coverage is something that was unfathomable a short time ago. One student in our sessions put it simply when discussing the value of *Wikipedia*: “Even Joe the Plumber is in *Wikipedia*!”

At the same time, we found credibility (another “C”) was less of a criterion for *Wikipedia* usage. Only 16 percent of the respondents in our survey reported using *Wikipedia* because it was more of a credible source of content than other Web sites.

Students in our sessions assumed they would need to substantiate what they first found in *Wikipedia* in their early stages of research with some additional fact checking [23].

Some students in the focus groups told us if they doubted a *Wikipedia* entry, they did some fact–checking elsewhere — a news clip on YouTube to “see if the two things added up.” Other students reported looking for *Wikipedia*'s editorial notes (e.g., the broom image at the top of an entry page, stating that an entry needed to be “cleaned up”).

These findings suggest the advantage of using *Wikipedia* far outweighs its perceived drawbacks (i.e., credibility and/or some professors' disapproval). Today's students appear to *negotiate* the accuracy of *Wikipedia* content, rather than assume it.



Conclusion

This study investigated how and why college students use *Wikipedia* within the context of using other resources for course–related research.

In particular, we investigated how *Wikipedia* fits into information–seeking strategies students employ for fulfilling course–related research assignments.

Overall, we found:

1. Students' driving need for background context makes *Wikipedia* one of the predictable workarounds that many students use, especially during the first stages of their research process.
2. Course-related research may begin with *Wikipedia*, but it rarely ends there. In our study, students employed a complex information problem strategy in their research processes, reliant on a mix of information resources that were from scholarly sources and public Internet sites.
3. In our study, we found the combination of coverage, currency, comprehensibility, and convenience drives *Wikipedia* use, in a world where credibility is less of a given — or an expectation from students — with each passing day.
4. Overall, college students use *Wikipedia*. But, they do so knowing its limitation. They use *Wikipedia* just as most of us do — because it is a quick way to get started and it has some, but not deep, credibility.

Opportunities

As a whole, our findings present some opportunities for librarians, educators, and information resource vendors.

The need for context-sensitive presearch sources and coaching services appears to be in high demand. There is a need for solutions that logically bridge the early stages of research to the rest of the research process and deliver the kinds of efficiencies students have come to expect (e.g., the “four Cs”).

When students have critical questions about narrowing down topics, figuring out search terms, and obtaining background information appears to be a critical time of need. It is a period of initial curiosity, but also one rife with inevitable frustrations in search of solutions. Our findings lead us to believe that support and solutions from multiple outlets, not just one tool, service, or individual, may work the best.

Whether these opportunities and our findings hold with students from other campuses is unclear. Further research about the use of *Wikipedia* by students needs to be conducted with different study populations.

Additional research about the relationship between using *Wikipedia* for course-related research and outcomes (e.g., grades, quality, and learning) would lend to a deeper understanding of *Wikipedia* usage, too. 

About the authors

Alison J. Head, Ph.D. and **Michael B. Eisenberg**, Ph.D. are the Co-Principal Investigators and Co-Directors of Project Information Literacy, which is based in the Information School at the University of Washington. Head is a Research Scientist in the Information School and Eisenberg is Dean Emeritus and Professor in the Information School.

E-mail: [ajhead1 \[at\] u \[dot\] washington \[dot\] edu](mailto:ajhead1@u.washington.edu) and [mbe \[at\] u \[dot\] washington \[dot\] edu](mailto:mbe@u.washington.edu).
The PIL Web site is located at [http://projectinfolit \[dot\] org](http://projectinfolit.org).

Acknowledgments

Hil Lyons, Karen Schneider, and Sarah Vital made insightful recommendations for this paper and we thank them for their time. This research was sponsored with a gift to the University of Washington's Information School from ProQuest and contributing funds from the John D. and Catherine T. MacArthur Foundation. A full report of the study is available at http://projectinfofolit.org/pdfs/PIL_Fall2009_Year1Report_12_2009.pdf.

Notes

1. For a discussion of *Wikipedia* and its authority, completeness, and reliability, see the following: Scott Jaschik, 2007. "A stand against *Wikipedia*," *Inside Higher Ed* (January), at <http://www.insidehighered.com/news/2007/01/26/wiki>, accessed 16 December 2009; Simson Garfinkel, 2008. "*Wikipedia* and the meaning of truth: Why the online encyclopedia's epistemology should worry those who care about traditional notices of accuracy," *MIT Technology Review* (November/December), at <http://www.technologyreview.com/web/21558/>, accessed 1 February 2009; and, Peter J. Nicholson, 2006. "The changing role of intellectual authority," *ARL* 247 (August), pp. 1–5, at <http://www.arl.org/arldocs/resources/pubs/mmproceedings/148/nicholson.pdf>, accessed 24 November 2009.

2. See the Project Information Literacy Web site at <http://projectinfofolit.org>.

3. The student discussion groups were held on seven campuses with full-time sophomores, juniors, and seniors at Harvard University, University of Illinois at Urbana–Champaign, Mills College, University of Washington, and with students, who had completed at least one semester at three community colleges, including Diablo Valley College (Calif.), West Valley College (Calif.), and Shoreline Community College (Wash.), during October, November, and December 2008.

4. For the discussion groups, we did not intentionally try to balance our sample for gender (one of the institutions in the campus sample was a women's college). Without this campus in the sample, more than half of the sample from co-ed campuses was female (63 percent).

5. We intentionally excluded any freshmen from our four-year institution sample and students who had taken fewer than 12 units from our community college sample. These students were more likely to discuss research strategies they had used in high school, rather than those they had developed (or were learning to develop) and had used, so far, in college.

6. In the discussion group sample, there was representation from students studying anthropology, art history, communication, economics, education, English, gender studies, global studies, health, history, international relations, languages, linguistics, music, political science, psychology, social studies, and sociology. To a much lesser degree (nine percent of the sample), some student "walk ins" were studying computer science, nursing, engineering, and business administration.

7. Survey respondents were full-time students enrolled at Harvard University, Illinois State University, University of Washington, and with students, who had completed at least one semester, at three community colleges, including Chaffey Community College (Calif.), Shoreline

Community College (Wash.), and Volunteer State Community College (Tenn.) during April, May, and June 2009. A PIL research protocol underwent Human Subjects at University of Washington, the institution sponsoring the research, and at each institution in the sample.

8. We defined “majors” in broad terms in our study to include students with declared majors in a specific discipline at four–year institutions and also students with a primary emphasis of study at two–year community colleges. We used a logistic regression to determine which majors were likely to use *Wikipedia* (see section on “Who is likely to use *Wikipedia*” in this paper for details).

9. The largest category of survey respondents was sophomores (43 percent), though juniors (25 percent) and seniors (24 percent) also made up the sample. Students studying in arts and humanities, social sciences, and the sciences comprised nearly half (42 percent) of the community college sample and about three–fourths of the four–year college sample (74 percent). A number of students had declared “other” majors (n=255); many were attending community colleges and taking courses in occupational training (e.g., dental hygiene, paralegal studies, radiology technician) and were recoded, as such.

10. For purposes of our analysis, we employed University of Washington’s scale for translating GPA to letter grades, courtesy of the Office of the Registrar, http://www.washington.edu/students/genclat/front/Grading_Sys.html, accessed 10 August 2009.

11. In the analysis, the independent variables for majors in architecture and engineering, arts and humanities, business, education, occupational training, and social sciences and a dependent variable of *Wikipedia* usage in our model.

12. The survey question (#13) was stated as follows: “Some students use *Wikipedia*, in one way or another, at some time during their course–related research process. How often do you use *Wikipedia*? Do you ever go to *Wikipedia* during your research process for course–related research, even if your instructor suggests that you should not?”

13. In addition, we found 92 percent (N=1,600) students in our sample reported using *Wikipedia* for obtaining background information when they conducted research for use in their everyday lives. See Alison J. Head and Michael B. Eisenberg, 2009. “Lessons learned: How college students seek information in the digital age,” *Project Information Literacy Progress Report* (December 2009), at http://projectinfolit.org/pdfs/PIL_Fall2009_Year1Report_12_2009.pdf, accessed 16 December 2009, p. 16.

14. For a detailed discussion about which resources students use to find information and fulfill certain research contexts, see Alison J. Head and Michael B. Eisenberg, 2009. “Lessons learned: How college students seek information in the digital age,” *Project Information Literacy Progress Report* (December 2009), at http://projectinfolit.org/pdfs/PIL_Fall2009_Year1Report_12_2009.pdf, accessed 16 December 2009.

15. In our prior research (2007), a survey was administered on a single campus with a smaller sample (n=178). We found a small amount of respondents (three percent) used *Wikipedia* as their first step in the research process; most used course readings first, see Alison J. Head, 2007. “Beyond Google: How do students conduct academic research?” *First Monday*, volume 12, number 8 (August), at <http://firstmonday.org/article/view/1998/1873>, accessed 16 December 2009.

16. In our logistic regression analysis, we did not investigate interaction effects between the different variables.

17. The survey question (#7) about using Google was worded so that it was use of Google for finding sites other than *Wikipedia*.

18. The logistic regression model contained five binary independent variables: enrollment in a two-year institution, use of course readings, use of instructors, use of Google, use of librarians, major area of study; 0-absent/1-present and five categorical independent variables for primary area of study/major: architecture and engineering, arts and humanities, business, education, occupational training (e.g., paralegal, radiology technician, dental hygienist, etc.). A variable for the area of study in social sciences was used as the intercept, or as a basis of comparison to other majors.

19. Lee Rainie and Bill Tancer, 2007. "36% of online American adults consult *Wikipedia*; It is particularly popular with the well-educated and current college-age students," *Pew Internet & American Life Project* (April), at <http://www.pewinternet.org/Reports/2007/Wikipedia-users.aspx?r=1>, accessed 16 December 2009.

20. Sook Lim, 2009. "How and why do college students use *Wikipedia*?" *Journal of the American Society for Information Science and Technology*, volume 60, number 11 (November), pp. 2,189–2,202.

21. In our discussion we define *information utility* broadly to cover the needs, standards and expectations students have for information within the context of course-related research. Previous definitions have defined information utility in terms of Web behavior and ease, convenience, and usefulness of information (Lim, 2009; Rieh and Hillgoss, 2007).

22. Where *Wikipedia's* publishing cycle per entry can take seconds, scholarly cycles, such as *Britannica's*, inevitably take longer. *Wikipedia's crowdsourcing* business model is the underlying mechanism driving its success. *Britannica* would have difficulty (though it has have considered it) competing in this market space, given its staff of paid experts, who write and/or vet content before it appears. See Eric Krangel, 2009. "*Britannica's* doomed plan to take on *Wikipedia*," *Business Insider: Silicon Alley Insider* (22 January), at <http://www.businessinsider.com/2009/1/britannicas-doomed-plan-to-take-on-wikipedia>, accessed 17 December 2009. For a discussion of crowdsourcing, see Jeff Howe, 2006. "Crowdsourcing: A definition," *Howe's Crowdsourcing blog* (2 June), at http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html, accessed 17 December 2009.

23. Lim (2009) also found that "student attitudes toward *Wikipedia* tended to be cautious, as they were aware that it may include inaccurate information, In other words, it seems that students did not use *Wikipedia* blindly," p. 2,200. Sook Lim, 2009. "How and why do college students use *Wikipedia*?" *Journal of the American Society for Information Science and Technology*, volume 60, number 11 (November), pp. 2,189–2,202.

References

Simson Garfinkel, 2008. "Wikipedia and the meaning of truth: Why the online encyclopedia's epistemology should worry those who care about traditional notices of accuracy," *MIT Technology Review* (November/December), at <http://www.technologyreview.com/web/21558/>, accessed 1 February 2009.

Alison J. Head, 2007. "Beyond Google: How do students conduct academic research?" *First Monday*, volume 12, number 8 (August), at <http://firstmonday.org/article/view/1998/1873>, accessed 16 December 2009.

Alison J. Head and Michael B. Eisenberg, 2009. "Lessons learned: How college students seek information in the digital age," *Project Information Literacy Progress Report* (December), at http://projectinfolit.org/pdfs/PIL_Fall2009_Year1Report_12_2009.pdf, accessed 16 December 2009.

Jeff Howe, 2006. "Crowdsourcing: A definition," *Howe's Crowdsourcing blog* (June 2), at http://crowdsourcing.typepad.com/cs/2006/06/crowdsourcing_a.html, accessed 17 December 2009.

Scott Jaschik, 2007. "A stand against Wikipedia," *Inside Higher Ed* (January), at <http://www.insidehighered.com/news/2007/01/26/wiki>, accessed 16 December 2009.

Eric Krangel, 2009. "Britannica's doomed plan to take on Wikipedia," *Business Insider: Silicon Alley Insider* (22 January), at <http://www.businessinsider.com/2009/1/britannicas-doomed-plan-to-take-on-wikipedia>, accessed 17 December 2009.

Sook Lim, 2009. "How and why do college students use Wikipedia?" *Journal of the American Society for Information Science and Technology*, volume 60, number 11 (November), pp. 2,189–2,202.

Peter J. Nicholson, 2006. "The changing role of intellectual authority," *ARL* 247 (August), pp. 1–5, at <http://www.arl.org/arldocs/resources/pubs/mmproceedings/148/nicholson.pdf>, accessed 24 November 2009.

Lee Rainie and Bill Tancer, 2007. "36% of online American adults consult Wikipedia; It is particularly popular with the well-educated and current college-age students," *Pew Internet & American Life Project* (April), at <http://www.pewinternet.org/Reports/2007/Wikipedia-users.aspx?r=1>, accessed 16 December 2009.

Soo Young Rieh and Brian Hilligoss, 2007. "College students credibility judgments in the information-seeking process," In: Miriam J. Metzger and Andrew J. Flanagin (editors), 2007. *Digital media, youth, and credibility*. Cambridge, Mass.: MIT Press, pp. 49–72.

Editorial history

Paper received 28 January 2010; accepted 16 February 2010.



“How today’s college students use *Wikipedia* for course–related research” by Alison J. Head and Michael B. Eisenberg is licensed under a Creative Commons Attribution–Noncommercial–Share Alike 3.0 Unported License.

How today’s college students use *Wikipedia* for course–related research
by Alison J. Head and Michael B. Eisenberg.

First Monday, Volume 15, Number 3 - 1 March 2010

<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2830/2476>

Abstract

Wikipedia has been hailed as one of the most prominent peer projects that led to the rise of the concept of peer governance. However, criticism has been levelled against *Wikipedia's* mode of governance. This paper, using the *Wikipedia* case as a point of departure and building upon the conflict between inclusionists and deletionists, tries to identify and draw some conclusions on the problematic issue of peer governance.

Contents

Introduction
Main characteristics of peer governance
Leadership and benevolent dictatorships
A summary of criticism on *Wikipedia's* governance
Case study: Inclusionists versus deletionists
The governance process, inclusionists and deletionists
Reflections
Lessons for peer governance
Conclusions
Proposals

Introduction

The open source software Linux and the popular free online encyclopedia *Wikipedia* are considered as prominent peer production projects, where individuals voluntarily participate and, using mechanisms of self-governance, produce digital commons. Peer production, a term coined by Benkler (2006), is a third open mode of production that has become typical of the Internet recently, where decisions arise from the free engagement and cooperation of producers. Peer governance is a new mode of governance and bottom-up mode of participative decision-making (Bauwens, 2005a; 2005b). It is the way that peer production, the process by which common value is produced, is managed.

However, criticism has been levelled against *Wikipedia* regarding its mode of governance. According to some of this criticism, the power structure within *Wikipedia* is invisible, vague and opaque, giving rise to a tyranny of structurelessness (Freeman, 1970; Bauwens, 2008). Critical questions such as “what kind of problems does *Wikipedia's* governance experience?” and “why does it happen?” are examined in this paper. The narrative of this paper is structured around the

conflict between inclusionists and deletionists. In conclusion, some tentative enhancement proposals are articulated.



Main characteristics of peer governance

Coffin (2006) mentions some obvious characteristics of successful open source/p2p communities. Firstly, the membership is open and widespread, premised on participation. The free collaboration among the members is geographically dispersed, asynchronous and organized in networks. Moreover, projects are transparent and dialogues among participants are recorded, with the materials of projects like *Wikipedia* subject to open review (there is a mechanism for institutional history). So, at the first glance, *openness*, *networking*, *participation* and *transparency* appear as the main characteristics of governance in peer projects. More closely, these projects do not operate in strict hierarchies of command and control, but rather in *heterarchies*. They operate “in a much looser [environment] which ... allows for the existence of multiple teams of participants working simultaneously in a variety of possibly opposing directions.” [1] According to Bruns (2008), heterarchies are not simply adhocracies, but *ad hoc* meritocracies which, however, are at risk of transforming themselves into more inflexible hierarchies. In addition, following Bauwens (2005a; 2005b), peer projects are based on the organizing principle of *equipotentiality*, *i.e.*, everyone can potentially cooperate in a project — no authority can pre-judge the ability to cooperate. In peer projects, equipotential participants self-select themselves to the section to which they want to contribute (Bauwens, 2005b). Moreover, unlike panoptism (*i.e.*, the way knowledge is distributed in hierarchical projects where only the top of the pyramid has a full view), peer groups are characterized by holoptism, *i.e.*, the ability for any part to have horizontal knowledge of what is going on, but also the vertical knowledge concerning the aims of the project (Bauwens, 2005b).



Leadership and benevolent dictatorships

Stadler (2008) submits that leadership in peer projects is not egalitarian, but *meritocratic*: “Everyone is free, indeed, to propose a contribution, but the people who run the project are equally free to reject the contribution outright ... The core task of managing a Commons is to ensure not just the production of resources, but also to prevent its degradation from the addition of low quality material.” Further, benevolent dictatorships are common (Bauwens, 2005a; 2005b; Malcolm, 2008). For instance, these can be found in Linux project where Linus Torvalds is the benevolent dictator (Malcolm, 2008) or in *Wikipedia* where Jimmy Wales holds that role. Coffin (2006) highlights the necessity for a benevolent dictator (who typically is one of the founders of the project), adding that the foundation developers and the early adopters set the project ethos as well. The founder, along with the first members, upholds the right to fork. Axel Bruns (interview with Bruns, 2009) defines benevolent dictators “as ones of several heterarchical leaders of the community, who have risen to their positions through consistent constructive contribution and stand and fall with the quality of their further performance.” It is obvious that through such leadership roles, they may need to push through unpopular decisions. As Bruns notes, “if they abuse that power, theirs become a malicious leadership” and what we should expect at this point is “a substantial exodus of community members.” Therefore, following Bruns’ narrative, “the continued existence of the project at that moment would depend

very much on whether the number of exiting members can be made up for in both quality and quantity by incoming new participants.”



A summary of criticism on *Wikipedia's* governance

Wikipedians describe their project's power structure as “a mix of anarchic, despotic, democratic, republican, meritocratic, plutocratic, technocratic, and bureaucratic elements” (Wikimedia Foundation Board of Trustees, 2008). As Bruns [2] points out, this passage shows something more than an “existing lack of clarity about governance structures” as well as “the continuing experimentation with approaches to community self-regulation which is currently taking place in a variety of spaces on the site.” Moreover, Bruns (interview with Bruns, 2009) emphasizes that there is a need to distinguish between different national *Wikipedias*. In this paper, I concentrate on the English version of *Wikipedia*, as the majority of literature deals with it. Its massive amount of content creates a number of governance problems. It is difficult for a relatively small group of administrators to keep track of everything that happens — or to express it in Bruns' style (interview with Bruns, 2009) — “in the far-flung regions of the site.”

Moreover, committed Wikipedians are not sometimes enough to prevent committed vandals from disruption: “As *Wikipedia* has grown, Wales has been forced to impose some more centralized, policelike measures — to guard against ‘edit warriors’, ‘point-of-view warriors’, ‘revert warriors’” (Pink, 2005) “We try to be as open as we can”, Wales says, “but some of these people are just impossible.” (Brown, 2007; Pink, 2005) Butler, *et al.* [3] point out that the hierarchy of roles creates “a class of people who apply the control mechanisms for the group: the administrators.” Forte and Bruckman (2008) underscore that the vagueness of the distinction among social and technical powers of the administrators leads to the accumulation of power in one section of the *Wikipedia* community. Thus, administrators are the enforcers of policy and take more authoritative roles “making more and more interpretive and ‘moral’ decisions about user behavior.” [4]

Furthermore, according to Bauwens (2008) a power structure in *Wikipedia* has been created, largely invisible and vulnerable to the tyranny of structurelessness, as described by Freeman (1970):

“Contrary to what we would like to believe, there is no such thing as a ‘structureless’ group. Any group of people of whatever nature coming together for any length of time, for any purpose, will inevitably structure itself in some fashion. The structure may be flexible, it may vary over time, it may evenly or unevenly distribute tasks, power and resources over the members of the group. But it will be formed regardless of the abilities, personalities and intentions of the people involved. The very fact that we are individuals with different talents, predispositions and backgrounds makes this inevitable. Only if we refused to relate or interact on any basis whatsoever could we approximate ‘structureless’ and that is not the nature of a human group.”

Freeman's argument is that in seemingly structureless groups hidden structures may impose different things on the rest.

An unregistered user of *Wikipedia* I randomly contacted cynically plays on the words when commenting that Jimmy Wales created "the structurelessness of a tyranny" indeed. Another random user observes that *Wikipedia* lacks a "functional system architecture" and "functional social contract." In fact, following a user named Yehuldi, "there is a social contract, and most users and most admins adhere to it. The fundamental flaw is that there is no way to deal with the minority of admins who don't." Bauwens (2008) emphasizes that after the recent debate amongst deletionists and inclusionists and the requirement of notability, "the editors are dominating the process, to the detriment of the more expert contributors of articles, and growth has stopped; on the side of the Foundation, it now transpires that the Board wishes to diminish the influence of the community and its voting rights." It would be interesting to see the main points of criticism according to the relevant *Wikipedia* article (January 2009) entitled *Criticism of Wikipedia*: "The major points of criticism of *Wikipedia* are the claims that the principle of being open for editing by everyone makes *Wikipedia* unauthoritative and unreliable ... that it [*Wikipedia*] exhibits systemic bias, and that its group dynamics hinder its goals."



Case study: Inclusionists versus deletionists

Wikipedia faces several governance problems, each with various ramifications. In this section a particular issue related to *Wikipedia*'s problematic governance is investigated. We examined an internal struggle between deletionists and inclusionists. It is based on a three month study (January–March 2009) of relevant literature, internal e-mail lists, external Web sites concerning *Wikipedia*, and e-mail interviews with (ex-)Wikipedians (some of them randomly chosen and others selected on the basis of their involvement in contributing to the development as well as criticism of *Wikipedia*) and experts (Bauwens, Bruns and Hartzog have written extensively on peer governance). The aim was to document the discourse of a battle between deletionists and inclusionists and the governance process at work.

An article published in the *Economist* (2008), under the title "The Battle for *Wikipedia*'s Soul," made widely known the internal struggle between two conflicting visions, the first one supported by inclusionists, and the second supported by deletionists. The inclusionists argue for a wide coverage of human knowledge, as *Wikipedia* should feature as many articles as users can produce. The maintenance of a certain relevance and quality for *Wikipedia*'s entries lies at the heart of deletionists' arguments. Deletionists — who claim that *Wikipedia* should be more cautious and selective regarding its content. They point to, for example, entries for almost 500 fictional Pokemon characters, indicating that they are harmful to the credibility and public image of the encyclopedia. Many inclusionists maintain that such disparities will disappear on their own, under the condition that *Wikipedia* is less restrictive editorially, so that anyone can add content about anything. They argue that *Wikipedia* does not have space constraints like a printed encyclopedia. They point to the fact that a majority of visitors reach specific entries in *Wikipedia* via search engines, thus never seeing trivial entries. On the other hand, deletionists assert that a certain quality threshold for articles will make *Wikipedia* more successful. They claim that so many entries for trivial subjects will lead to *Wikipedia* not taken very seriously.

I will next examine the governance process in terms of this discussion.

The governance process, inclusionists and deletionists

The *Wikipedia* entry entitled “Deletionism and Inclusionism in *Wikipedia*” (January 2009) offers an illuminating account about the history of this conflict. *Wikipedia* follows some specific policies about content creation. These policies are specific but at times are also inconsistent and conflicting. Concerning conflict resolution and inclusion, there are pages titled “Articles for Deletion,” where apart from discussing content, refer to “differing perspectives on how to edit an ideal encyclopedia.” [5] When a given debate is completed, an administrator judges community consensus [6]. Entries which do not require discussion are immediately deleted by administrators (Riehle, 2006). If a decision of an administrator is disputed, the community discusses it in a field called “Deletion Review.” On some occasions, controversial disputes and issues spread across the Internet outside of *Wikipedia*. In some cases, in internal *Wikipedia* conflicts, persistent debaters can wear down their opponent (O’Neil, 2009). Barry Kort, a *Wikipedia*ian and a MIT Media Lab scientist, suggests [7] that the source of the conflict between inclusionists and deletionists can be traced to *Wikipedia*’s lack of a conflict resolution process over content. “Festering content disputes eventually become disputes over the demeanor of combative editors.” [8] In spite of the fact that *Wikipedia* has some policies over content creation, Kort notes that:

“*Wikipedia* has evolved a helter–skelter hodgepodge of WP:RULES which are mutually inconsistent and conflicting. Those who become adept at gaming the system can thus pick and choose among the hodgepodge of rules to clobber their adversary (and even justify a block or a ban).”

Hence, the resolution process over content gave birth to the battle between inclusionists and deletionists. During this conflict two associations were initiated by administrators — the Association of Inclusionists *Wikipedia*ians (AIW) and the Association of Deletionists *Wikipedia*ians (ADW). Each has a Wikimedia page, where their members, perspectives and principles are treated. Hartzog [9] noted that the Web pages of ADW visibly follow traditional organizational practices while AIW considers itself as a movement.

Several (ex–)*Wikipedia*ians interviewed thought that this battle was detrimental to *Wikipedia*. G., a *Wikipedia* contributor, pointed out that “the time spent arguing fine points could be used elsewhere, creating content or solving other problems.” F., another *Wikipedia* contributor, remarked that “this inclusionist vs deletionists thing has been absolutely overstated. The majority of us [contributors] create and contribute content and do not participate in this battle, which after all only weakens our motive power.” Moreover, C., a prominent ex–*Wikipedia*ian once a deletionist and later an inclusionist, pointed out the problems with *Wikipedia*’s governance:

“The crux of the battle between ‘inclusionists’ and ‘deletionists’ is over what subjects should be considered ‘notable’ for purposes of inclusion in *Wikipedia* ... I would not say that the policy itself is really part of the problem. Rather, it is open editing policy and the ‘consensus’ policy, and how they are administrated, that I identify as

the more likely culprits [he means the instant and anonymous editing of articles] *Wikipedia's* governance is so diffuse and dysfunctional, that even they don't know how to describe it ... I was interested to see that Jimbo Wales [nickname of Jimmy Wales, *Wikipedia's* founder] effectively admitted ... that *Wikipedia's* policies were essentially made up as they went along. This *ad hoc* nature of *Wikipedia's* governance, coupled with some basic flawed assumptions upon which the project was based, made all the drama with *Wikipedia* inevitable.”

However, C. clarified that the inclusionism vs. deletionism debate would still have taken place even if *Wikipedia* had a more rational and functional governance mechanism: “It’s just that it would have been less of a distraction” he remarked, adding that this conflict was not a root problem but a symptom. Bauwens [10] disagrees with C.’s remarks and maintained that the battle was actually a root problem. Bauwens suggested that when there are abundant resources, people do not have to fight over resources but instead self-aggregate. When there is scarcity, decisions have to be made about allocation through democratic, hierarchical or market mechanisms. Thus, following Bauwens’ view, “what deletionism does, is to artificially create a scarcity and hence a power mechanism where none was objectively necessary. So, [this battle] is a fundamental issue.” Concluding, Bauwens underlined that “of course you can argue that even with deletionism, an appropriate democratic mechanism may have been selected, and that would have mitigated the rampant power abuse ... So, in a way, there are different levels of analysis, very much inter-related so that any root cause never exists on its own, causing all the others.”

Hartzog, in an e-mail exchange between me and Bauwens (2009), took the point further seeing inclusion and exclusion (as he prefers calling deletionism) as a consequence of drawing boundaries:

“The challenge in both communities and knowledge spaces is how to create aggregates in which boundaries are interpenetrated and overlapping. In knowledge spaces, it’s tagging, *i.e.*, non-‘mutually exclusive’ categorization schemas. In communities, it’s cosmopolitan multiculturalism, *i.e.*, non-‘mutually exclusive’ categories. I think that the problem has always been central to human civilization, but the information technologies ... have given us an ease and speed that bring the problem to the fore.”

Hartzog ended his philosophical narrative with Adorno, saying that “we can’t avoid categories and boundaries, so all we can do, and we must do it, is to remain reflective and compassionate about our inclusions and exclusions.”

Bruns [11] considered the debate over inclusion or deletion as more suited to *Britannica* than *Wikipedia* — as “in *Wikipedia's* digital environment, there’s certainly no commercial or practical reason to exclude any topic from being covered (unlike *Britannica*, where adding another topic

requires more staff resources and adds further to the page count).” Therefore, Bruns [12] argued: “the question of whether a topic is worthy of inclusion in the encyclopedia now comes down more simply to a question of whether anyone is able to write a good entry about it — and ‘good’ here means both well-written and in line with *Wikipedia*’s core principles of NPOV, verifiable, and not based on original research.” Like F. and G., some of *Wikipedia*’s contributors I contacted, Bruns [13] wondered to what extent the importance of that struggle has been overstated and how much of this struggle between different philosophies is connected with day-to-day practice within *Wikipedia* itself. In other words, perhaps the start of a division is taking place, between those who are attempting to develop a conceptual framework for describing different schools of thought amongst *Wikipedia*’s contributors at a more abstract level, and those who continue to edit and develop *Wikipedia* at a practical, everyday level [14]. Bruns does not belittle the search for better theoretical frameworks to describe *Wikipedia*, as he believes it is important that *Wikipedia* is reasonably clear about what it chooses to cover or not to cover [15]. However, he suggests that the vast majority of *Wikipedia*’s users and contributors probably would not know that there are factions called deletionists and inclusionists, and would not self-define as one or the other:

“[They] may even say that in practice, the decision between including and deleting is made on a much more fine-grained, case-by-case basis that shows a great deal more complexity than a simple dichotomy is able to do. And that ... is a result of what *Wikipedia* fundamentally is: it’s not a controlled, even controllable, well-organised mechanism for developing a reliable knowledge base that asymptotically approaches perfection through careful editorial quality control processes (as encyclopaedias of the traditional type may once have claimed to be), but something much more unruly — a sometimes messy, self-organising, continuously unfinished collaborative process that relies not on hierarchical structures, but on the wisdom of crowds for its quality control processes.” [16]



Reflections

Wikipedia is about representations of knowledge, about unfinished artifacts in a constant process of creation and evaluation. It does not rely on hierarchical structures, but on the wisdom of the crowds for its quality control processes. This is undoubtedly a valuable lesson learned by Bruns (2008; interview with Bruns, 2009). It illustrates that *Wikipedia* is a peer project, most of the times, relied upon self-organized, uncontrollable, heterarchical structures. Of course, this does not imply that there are no particular requirements to be met. On the one hand, *Wikipedia* follows some certain rules (WP:RULES) for content creation, which are in some cases mutually inconsistent and conflicting. Therefore, administrators who are adept at manipulating the rules are capable of defeating their foes in order to justify a deletion, block or ban. Active and organized minorities often prevail over the uncoordinated majority and others.

Many critically commented on the lack of clarity of *Wikipedia's* rules and on the absence of a functional conflict resolution process for content disputes, without turning these disputes into editorial slugfests. The majority of participants in this research suggested that there is an urgent need for reform. In particular, Kort [17] pointed out that “the whole Rules and Sanctions paradigm is ill–conceived and should be scrapped in favor of a ‘21st Century Community Social Contract Model’ consistent with collegial norms of academic and scholarly enterprises.” Further, it was argued that artificial scarcity, which the deletionist approach inevitably creates, leads to a need for a power mechanism. An inclusionist view, on the other hand, would avoid many internal conflicts. Moreover, from discussions with (ex–)Wikipedians, it became clear that this battle over content is detrimental to the project. This struggle facilitates an “unproductive need” for self–definition, while the case itself is much more complex than just a simple dichotomy.

The consensus of my discussions and interviews with experts and (ex–)Wikipedians can be very well reflected in Bruns’ comments [18]: “If those criteria [*Wikipedia's* core principles — neutral point of view, verifiability, non–original research] are met, I can’t see any reason to delete a submitted entry — however obscure the topic may be.” Hence, a recommendation could be that the project return to its inclusionist roots. At the same time, following Kort’s proposal, an unambiguous community social contract model should be openly formulated to secure, protect, empower and enrich the peer mode of governance.



Lessons for peer governance

Wikipedia's mode of governance is an unfinished artifact. It follows the constant reform and refinement of social norms within the community. However, open participation in combination with an increasing number of participants makes the situation more complex (O’Neil, 2009). By examining the battle between inclusionists and deletionists, it was understood that *Wikipedia's* lack of a clearly defined constitution, or what Kort [19] calls a “Community Social Contract Model,” breeds a danger for local jurisdictions where small numbers of participants create rules in conflict with others (O’Neil, 2009). These challenge the sustainability of the peer project. Arguably, the degree of openness in every aspect of a peer project’s governance should be questioned and closely investigated.

During conflicts, persistent, well–organized minorities can adroitly handle and dominate their opponents. The values of communal evaluation and equipotentiality are subverted by such practices. As Hilbert [20] remarked group polarization is a significant danger that open, virtual communities face: “discourse among like–minded people can very quickly lead to group polarization ... which causes opinions to diverge rather than converge ... [so], it is very probable that the strongest groups will dominate the common life.” In these cases, transparency and holoptism are in danger. Decisions are being made in secret and power is being accumulated. Authority, corruption, hidden hierarchies and secrecy subvert the foundations of peer governance, that is openness, heterachy, transparency, equipotentiality and holoptism — the very essence of *Wikipedia*.

Peer governance is a suitable mode to govern large sources, working more effectively in abundance [21]. This constitutes the main argument why *Wikipedia* should return to its inclusionist roots, while a functional, scrupulous and scientifically designed resolution process for content disputes and an unambiguous community social contract model needs to be implemented.



Conclusions

As noted earlier, the main characteristics of peer governance are equipotentiality, heterarchy, holoptism, openness, networking, and transparency. “The aim of peer governance is to maximize the self–allocation and self–aggregation by the community, and to have forms of decision–making that do not function apart and against the broader collective from which they spring.” [22]

Wikipedia is constantly at risk of transforming itself into an inflexible, despotic hierarchy, while new disputes are emerging about the mode of content creation and governance. As the size of *Wikipedia* increases (in terms of both content and participants), it becomes more difficult and complex for a relatively small group of administrators to keep track of everything that happens “in the far–flung of the site.” [23] Co–ordination problems on interpersonal and interorganizational levels as well as gaps concerning the interests and the identities of the inter–Wikipedian communities result in governance crises, threatening the sustainability of the project. Active and organized minorities often prevail over the uncoordinated majority and others. Further, the vague distinction among the social and technical powers of administrators — who sometimes take more authoritative roles and make more ‘moral’ decisions about user behavior — leads to power accumulation in one section of the community (Forte and Bruckman, 2008). A functional resolution process for resolving content disputes and an unambiguous community social contract model are needed. *Wikipedia* may follow some rules regarding content creation, which, however, in some cases are mutually inconsistent and conflicting. Thus, administrators, adept at gaming the system, can pick and choose among rules, and defeat their opponents. Moreover, how do you balance participation and selection for excellence? In other words, “how to make sure that truth does not become the rule of the majority and that expertise can find its place?” [24]

In addition, artificial scarcity, the fundamental point of deletionists, leads to a need for a power mechanism. A line has to be drawn between the sphere of abundance, where self–allocation is natural, and the field of scarcity, where cost–recovery requirements demand choices. As has been articulated, for the latter, some formal democratic rules are needed. According to Bauwens [25]:

“Rules and requirements that select for excellence and function against external attacks are legitimate, but processes that protect a privileged layer are illegitimate and destroy or weaken both the self–aggregation and the democratic procedures. So, what can go wrong? 1) The sphere of abundance can be designed to create artificial scarcities, which create limited choices and therefore power to choose ... 2) In the sphere of the Foundations, such as the Wikimedia Foundation, which manage the infrastructure of cooperation, a lot can go wrong ... such as a lack of differentiation between community and private business interests, and the lack of community representation in the Foundation ... So, when the private power of Jimmy Wales and the formal leaders of the

Foundation mix and merge with the informal powerbase of the privileged editors, there is a lot of potential for abuse.”

Proposals

Bauwens [26] suggested that in the case of *Wikipedia* it would be essential “to return the project to its inclusionist roots, *i.e.*, recognition of abundance; the strengthening of democracy and community representation in the Wikimedia Foundation; full transparency and business divestment in the Foundation.” Based on my research, I side with a moderate inclusionist perspective of *Wikipedia*’s content. After all, to put it in Bruns’ style (2008), *Wikipedia* is about “representations of knowledge.” A bottom–up self–organizational mode is enhanced by the reform of rules for content creation, creation of a functional process for resolving content disputes and the formulation of an unambiguous community social contract model. These developments are crucial steps supporting the sustainability of the project and empowerment of peer governance.

While some worry about a danger of the tyranny of the majority, a notion of meta–governance — that is operating in a context of negotiated decision–making — will handle many issues. Bauwens, partly echoing Jessop (2003) on meta–governance, noted:

“A possible solution is to create a mirror page for experts, who do not make the final decision, but can point to scholarly weaknesses in the open pages. I would also recommend the allowing of personal or collective forks, so that people can encounter a variety of perspectives, next to the official consensus page.”

In peer projects, the reintroduction of certain elements of traditional organization (hierarchy or market; project–based organization) contributes to their sustainability (Loubser and den Basten, 2008; Benkler, 2006). These elements are, after all, part of what it is understood as peer governance — an heterarchical, hybrid mode of organization. Bauwens’ proposition of allowing experts to have their own distinct voice (even in the form of a mirror page) corresponds to Forte and Bruckman’s [27] interpretation of Ostrom’s (2000) principles: “the continued presence of the old–timers, who carry a set of social norms and organizational ideas with them,” contributes to the sustainability of the project. In addition, a distinction is required for the social and technical powers of administrators, in order to avoid power accumulation. 

About the author

Vasilis Kostakis has studied business science, information management, political theory and technology governance at the University of Macedonia (BSc), University of Amsterdam (MSc), and Tallinn University of Technology (MA). At the moment, he is a Ph.D. student at TUT on technology governance and a member of the P2P Foundation.

E–mail: kostakis [dot] b [at] gmail [dot] com

Acknowledgements

This paper is based on author's M.Sc. and M.A. theses filed and approved by the University of Amsterdam (2009) and Tallinn University of Technology (2009). The author is deeply indebted to Wolfgang Dreschler, Rainer Kattel, Anna Snel, Rik Maes, and George Dafermos for their comments and encouragement. Moreover, he wishes to thank Michel Bauwens, Axel Bruns, Paul Hartzog, Mathieu O'Neal, Barry Kort, and all the Wikipedians and the ex-Wikipedians, who participated in the research of this paper. Had it not been their contributions, this paper would not have materialized. In addition, the author acknowledges helpful comments made by anonymous reviewers of *First Monday*. Last, but not least, he acknowledges financial support from the Estonian Science Foundation grant 2009–2010 for research on "Public Administration and Innovation Policy."

Notes

1. Bruns, 2008, p. 26.
2. Bruns, 2008, p. 140.
3. Butler, *et al.*, 2008, p. 1,107.
4. Forte and Bruckman, 2008, p. 8.
5. Rettberg, 2005, p. 9.
6. *Wikipedia*, 2009. "Criticism of *Wikipedia*" (January); *Wikipedia*, 2008. "Wikipedia: Protection policy" (October).
7. Interview with Kort, 2009.
8. *Ibid.*
9. Interview with Hartzog, 2009.
10. Interview with Bauwens, 2009.
11. Interview with Bruns, 2009.
12. *Ibid.*
13. *Ibid.*
14. *Ibid.*
15. *Ibid.*

16. *Ibid.*
17. Interview with Kort, 2009.
18. Interview with Bruns, 2009.
19. Interview with Kort, 2009.
20. Hilbert, 2007, p. 120.
21. Interview with Bauwens, 2009.
22. *Ibid.*
23. Interview with Bruns, 2009.
24. Interview with Bauwens, 2009.
25. *Ibid.*
26. *Ibid.*
27. Bruckman, 2008, p. 10.

References

- M. Bauwens, 2008. "Is something fundamentally wrong with *Wikipedia* governance processes?" P2P Foundation blog, at <http://blog.p2pfoundation.net/is-something-fundamentally-wrong-with-wikipedia-governance-processes/2008/01/07>, accessed 7 October 2008.
- M. Bauwens, 2005a. "The political economy of peer production," *CTHEORY* (1 December), at <http://www.ctheory.net/articles.aspx?id=499>, accessed 7 September 2008.
- M. Bauwens, 2005b. "Peer to peer and human evolution," *Integral Visioning*, at <http://integralvisioning.org/article.php?story=p2pththeory1>, accessed 7 September 2008.
- Y. Benkler, 2006. *The wealth of networks: How social production transforms markets and freedom*. New Haven, Conn.: Yale University Press.
- D. Brown, 2007. "Jimmy Wales '83," Randolph School (11 December), at <http://www.randolphschool.net/alumni/welcome/profiles.asp?newsid=432566>, accessed 25 October 2008.
- A. Bruns, 2008. *Blogs, Wikipedia, Second Life, and beyond: From production to produsage*. New York: Peter Lang.

B. Butler, E. Joyce, and J. Pike, 2008. "Don't look now, but we've created a bureaucracy: The nature and roles of policies and rules in *Wikipedia*," *Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems* (Florence, Italy), pp. 1,101–1,110.

J. Coffin, 2006. "Analysis of open source principles in diverse collaborative communities," *First Monday*, at <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1342/1262>, accessed 20 October 2008.

Economist, 2008. "The battle for *Wikipedia*'s soul" (6 March), at <http://www.economist.com/>, accessed 24 January 2009.

A. Forte and A. Bruckman, 2008. "Scaling consensus: Increasing decentralization in *Wikipedia* governance," *Proceedings of the Proceedings of the 41st Annual Hawaii International Conference on System Sciences*, p. 157; version at <http://www.cc.gatech.edu/~aforte/ForteBruckmanScalingConsensus.pdf>.

J. Freeman, 1970. "The tyranny of structurelessness," *Berkeley Journal of Sociology*, volume 17, pp. 151–165.

M. Hilbert, 2007. "Digital processes and democratic theory," at <http://www.martinhilbert.net/democracy.html>, accessed 25 April 2009.

B. Jessop, 2003. "Governance and metagovernance: On reflexivity, requisite variety, and requisite irony," In: H.P. Bang (editor). *Governance as social and political communication*. Manchester: Manchester University Press, pp. 142–172, and at <http://eprints.lancs.ac.uk/215/>, accessed 20 January 2009.

M. Loubser and M. den Besten, 2008. "Wikipedia admins and templates: The organizational capabilities of a peer production effort," at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1116171, accessed 11 March 2010.

J. Malcolm, 2008. *Multi-stakeholder governance and the Internet Governance Forum*. Perth: Terminus Press.

M. O'Neil, 2009. *Cyberchiefs: Autonomy and authority in online tribes*. London: Pluto Press.

E. Ostrom, 2000. "Collective action and the evolution of social norms," *Journal of Economic Perspectives*, volume 14, number 3, pp. 137–158.

D. Pink, 2005. "The book stops here," *Wired*, volume 13, number 3, at http://www.wired.com/wired/archive/13.03/wiki_pr.html, accessed 25 October 2008.

S. Rettberg, 2005. "All together now: Collective knowledge, collective narratives, and architectures of participation," *Digital Arts and Culture Conference Proceedings* (RMIT University, Melbourne); version at <http://retts.net/documents/cnarrativeDAC.pdf>, accessed 10 March 2010.

D. Riehle, 2006. "How and why *Wikipedia* works: An interview with Angela Beesley, Elisabeth Bauer, and Kizu Naoko," *International Symposium on Wikis (WikiSym '06)*; version at

<http://dirkriehle.com/computer-science/research/2006/wikisym-2006-interview.html>, accessed 10 March 2010.

F. Stadler, 2008. "On the differences between open source and open culture," at <http://publication.nodel.org/On-the-Differences>, accessed 21 October 2008.

Wikimedia, "Community petition," at http://meta.wikimedia.org/wiki/Meta:Community_petition, accessed 31 October 2008.

Wikipedia, "Criticism of *Wikipedia*," at http://en.wikipedia.org/wiki/Criticism_of_Wikipedia, accessed 23 January 2009.

Wikipedia, "Deletionism and inclusionism in *Wikipedia*," at http://en.wikipedia.org/wiki/Deletionism_and_inclusionism_in_Wikipedia, accessed 25 January 2009.

Wikipedia, "*Wikipedia*: Protection policy," at http://en.wikipedia.org/wiki/Wikipedia:Protection_policy accessed 25 October 2008.

Interviews

The following table contains the names and roles of the interviewees as well as the methods and periods of the interviews:

Table 1: Interviews for this paper.			
Name	Role	Method	Period
Bauwens, M.	Founder of the P2P Foundation	E-mail exchange (semi-structured interviews) & Google Talk chat	February 2009
Bruns, A.	Associate Professor at Queensland University of Technology. Author of <i>Blogs, Wikipedia, Second Life and beyond: From production to produsage</i> (Peter Lang, 2008)	E-mail exchange (semi-structured interviews)	February 2009

C. (anonymity)	Active member & author of <i>Wikipedia Review</i>	E-mail exchange (semi-structured interviews)	February 2009
G. & F. (anonymity)	Active (ex-)Wikipedians & <i>Wikipedia Review</i> users (randomly chosen)	E-mail exchange (structured interviews)	February 2009
Hartzog, P.	Ph.D. student at University of Michigan working on Panarchy	E-mail exchange (semi-structured interviews)	February 2009
Kort, B.	MIT Media Lab scientist & <i>Wikipedia</i> contributor	E-mail exchange (semi-structured interviews)	February–March 2009
Yehuldi & two anonymous <i>Wikipedia</i> users	Users of <i>Wikipedia</i> & <i>Wikipedia Review</i>	They participated in a discussion that took place in <i>Wikipedia Review</i> forum (http://wikipediareview.com/ ; membership is required). I did not actively get involved in the discussion.	January 2009

The full content of most of the interviews has been published at <http://blog.p2pfoundation.net/peer-governance-and-wikipedia-interview-with-bauwens-bruns/2009/06/22>; <http://blog.p2pfoundation.net/peer-governance-and-wikipedia-interview-with-cedric-and-barry-kort/2009/06/23>; and, <http://blog.p2pfoundation.net/peer-governance-and-wikipedia-interview-with-hartzog-discussion-with-bauwens-cedric-hartzog/2009/06/24>, accessed 28 July 2009.

Editorial history

Paper received 27 July 2009; revised version received 6 March 2010; accepted 11 March 2010.



This work is in the Public Domain.

Identifying and understanding the problems of *Wikipedia*'s peer governance: The case of inclusionists versus deletionists by Vasilis Kostakis.

First Monday, Volume 15, Number 3 - 1 March 2010

<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2613/2479>

Abstract

In a number of articles or books, advertising is pointed to as a possible way of financing open access (OA) journals. Very little work seems to have been done on finding out how advertising actually functions as a source of financing for OA journals. A survey was carried out to explore the field, both why journals did not employ advertising, and how advertising was employed. The findings show little uptake of advertising among OA journals, and indicate that there is a lack of understanding of how advertising could best be employed.

Contents

Introduction
Forms of advertising
Survey background
The survey
Conclusion

Introduction

In his book on how to establish and operate open access journals, David Solomon wrote [1] that “A [...] way to generate income from the operation of an OA journal is through advertising on the journal’s Web site.” Solomon dedicated several pages to discussing the possibilities of generating advertising income. In other sources, advertising is mentioned as a possible source of income, but only in passing. It is difficult to find any real treatment of the subject — see, for example, Björk and Hedlund (2009) and Hedlund, *et al.* (2004). Crow [2] examined the subject in detail, but except for examples of journals using different kinds of advertising, there was little about what OA journals actually do. I have not been able to find any survey or analysis of what advertising actually means for OA journals.

Advertising revenue is important to many media, not the least online newspapers. Contrary to some scholarly journals, newspapers depend on generating advertising revenue in order to finance their operations. Very few newspapers have tried to generate income directly and solely from readers, and — to my knowledge — none from their authors. To some extent, newspapers have tried to generate revenue from their back files, by making access to older information — that is, their archives — a paid service. Libraries often subscribe to these kind of services. For many online newspapers, the online news service is an offspring of a traditional newspaper, financed by subscriptions, sales and advertising revenues.

For traditional scholarly journals, advertising has been a non-existent or negligible source of income. The readership is too small to be interesting to advertisers or the journal itself is published too irregularly to be suitable for advertising. For some journals, the readership will often not constitute a meaningful target group for an advertiser. The exceptions to this are large, frequently published journals with strong connections to professional societies or associations, like medical journals. For such journals, advertising has been and will be an important source of income [3].

A transition to OA publishing, with an Internet presence as the means of distribution, creates new possibilities for scholarly journals relative to advertising income. OA journals constantly create new scholarly content to attract very specific readers, but this content is not tailored to create advertising income. Hence, all OA journals have some kind of readership of some size and composition, dependent on the latest developments in research in a given discipline. OA journals have an additional advantage in that archival content is valuable and attracts readers. Therefore, this longer “lifespan” for a given archival article in an OA journal — compared to one in an Internet newspaper — will offset the significantly smaller (but focused) circulation of an OA journal. This archival content will also compensate for the less frequent publishing schedule of an OA journal compared to a daily or weekly newspaper.



Forms of advertising

There are a number of mechanisms for generating advertising revenue for an OA journal. Some of these mechanisms resemble those available to traditional journals, like directly negotiated product advertisements. These “traditional” advertising forms need administrative resources to negotiate content, location and pricing, as well as statistical services on views or clicks and invoicing. This kind of “negotiated” advertising could also lead to problems with editorial integrity — or to suspicions concerning this integrity [4].

Online advertising also comes in forms that are unknown in traditional publishing. “Affiliation” describes these new forms of advertising. This means that the publisher joins an affiliate network of some kind, either directly with some advertiser or through a third party. Typically, the publisher is paid not for time invested or the space used for advertising, but for the traffic brought to the advertiser — by the click, per registration or as a percentage of sales. There is no negotiation, the publisher either applies to become an affiliate or not, based on the advertisers’ range of products or services and on the commission structure offered. Either the advertiser accepts the publisher, or rejects — generally, a rejection will be based on poor Web site quality or inappropriate content. The percentage of rejections is often very low. Editorial integrity is not threatened, as there is no communication about editorial content between the publisher and advertiser.

If an OA journal is in a field where books are important, affiliation with Amazon or a national Internet bookstore (depending on journal language and geographic distribution of readership) could be a way of generating income. The simple way of doing this is to place a clickable logo on the journal Web site. The more pages the logo is found on, the better the chances of generating income. A more labour-intensive way is to link to specific book titles — books reviewed, discussed in articles or cited in the journal. This may result in significantly more income, but obviously requires more resources.

A more general way of employing advertising is to affiliate with Google AdSense. This Google service places ads on your Web pages. Their choice of ads to place on your pages depends on an automated analysis of the textual content of pages. A given journal sets aside space on their pages, and leave it to Google to fill in the space with ads. The journal has no control over what advertising is shown on their pages. The ad content actually differs from viewer to viewer, based in part on what domain the viewer is coming from. There are some mechanisms for a journal to exclude advertising from specified sources. The journal also has very little control over revenue, but has to accept Google's numbers. Implementing Google AdSense is a one-time operation, so income generated this way requires little additional work for a given journal.



Survey background

While OA journals generally seem to have problems in finding stable and long-term financing, relatively few OA journals seem to employ advertising as a means of generating revenue.

It therefore seemed interesting to find out why so few OA journals seek advertising in any form. Based on conversations with scholarly editors, I expected to find a high degree of ideological resistance to the idea of advertising.

I was also interested in understanding how those OA journals that accepted advertising worked with advertisers. Did they affiliate — and if so, with whom — or did they negotiate directly with advertisers? The expectation was that journals, especially smaller journals, would prefer to affiliate, mainly with Google AdSense, as this would be a low-cost way of generating income, while larger journals would go for more labour-intensive ways of employing advertising. For those that employed Google AdSense I also asked for financial information to see if any background variable could be seen to have a clear influence on the income potential of a given journal.

For both sets of questions, I was also interested in any discernible pattern based on background variables like language, subject, journal size, etc.

The survey was constructed in three parts: one general part with general and background information on the responding journal and a question whether the journal accepted advertising or not. Those journals responding no to this question were presented with questions aimed at clarifying the reasoning behind their non-acceptance. The respondent could choose one or more reasons, or add other reasons or clarifying the answer with a comment field. Journals accepting advertising were asked how they selected advertising (direct negotiation, affiliation and — if affiliates — what kind of advertisers they affiliated with). Those using Google AdSense then were asked about click-through rates and income per thousand clicks.

At the end, all respondents were given the chance to comment on the survey and to add any information they felt relevant.



The survey

On 13 May 2009, I downloaded a file containing information on all 4,148 journals then in the Directory of Open Access Journals (DOAJ; <http://www.doaj.org/>).

Every journal was assigned a serial number, and a random selection of journals was taken by finding journals whose serial number was divisible by 10, then 9, 8 and 7, giving a sample of 1,719 journals. All Nordic and Baltic journals were included in the sample.

I then tried to assign an e-mail address to each journal, in order to mail this survey. A not insignificant number of journals hid their e-mail addresses; 387 journals were removed from the sample, primarily due to a lack of visible e-mail addresses. While journals with no visible e-mail addresses came from all over the world, problems with language (my language skills) probably led to a lower participation rate for journals using languages other than English, Scandinavian, German, Spanish or Portuguese. These issues did not apply to journals using Open Journals System (OJS; <http://pkp.sfu.ca/?q=ojs>) as e-mail addresses usually are found at a given location in the journal structure in these journals.

The remaining 1,332 journals were e-mailed the survey between 14 May to 6 October 2009. Some of these messages bounced and in other cases administrators of journals decided not to participate in the survey. In total, the survey was answered by representatives of 474 journals, a response rate of 35.6 percent. Of these, 377 gave full answers to the survey, giving a response rate of 28.3 percent. These answers representing 377 journals were used for further analysis.

Publisher size

Statistics from the entire DOAJ file indicate that most journals are published by single-journal publishers — 2,430 of 4,148 journals, or 58.6 percent of all DOAJ journals. In fact, 97.9 percent of publishers listed in DOAJ create five or fewer journals, publishing a total of 72.8 percent of all DOAJ journals. How do we define a publisher? Is it the editorial team that is the publisher, or is it the technical organisation that operates the infrastructure? The large number of small publishers in DOAJ is probably a result of assuming that the editorial team is equivalent to the publisher, at least for those journals representing academic institutions. An assumption is that the larger the publisher, the more professional a publishing venture it is. It is also probable that professional publishers and less professional ones will have different policies and views on how publishing should be financed. It is therefore interesting to compare the respondents with the DOAJ population concerning publisher size. Twenty-two journals that responded could not be identified in the DOAJ population so they were removed.

Table 1: Size distribution of publishers (number of journals published) in DOAJ and in survey.										
Publisher size	1	2–5	6–10	11–15	16–20	21–50	51–100	161	188	
DOAJ percentage of journals (N=4,058)	58.6%	14.2%	6.4%	3.2%	1.4%	2.6%	5.3%	3.8%	4.5%	100.0%
Sample percentage	76.9%	13.0%	5.6%	1.7%	0.6%	0.3%	0.8%	0.0%	1.1%	100.0%

of journals (N=355)										
------------------------	--	--	--	--	--	--	--	--	--	--

In Table 1 we note that single-journal publishers are over-represented, medium-sized (2-10 journals) are fairly represented while publishers with more than 10 journals are greatly underrepresented. The one publisher in the column "161" is the Hindawi Publishing Corporation (<http://www.hindawi.com/>). No Hindawi journal participated in this survey.

Journal language

Journals in the survey were published in 60 different countries. In addition there is a "International" category containing 12 journals that were unable to pinpoint a single country as their country of publication.

English was the main language for 66 percent of the surveyed journals, Spanish in 14 percent and Portuguese in five percent. Various languages and combinations of smaller languages and English account for 15 percent of the total.

Comparisons with the DOAJ population were difficult, as DOAJ lists all languages that a journal uses. As mentioned previously, the survey has a bias towards over-representing journals published in Western European languages. Furthermore, I was not able to secure comparable data on country of publication from DOAJ. Hence, I do not have a clear picture of bias in the sample relative to the geographical distribution of journals.

Use of advertising

Obviously, the question of acceptance of advertising by journals was one of the most important in the survey.

Table 2: Journals accepting advertising or not accepting advertising by publisher size (actual numbers and percentage).									
Publisher size	1	2-5	6-10	11-15	16-20	21-50	51-100	188	Total
Not accepting advertising	217	36	17	4	1			3	278
Accepting advertising	56	10	3	2	1	1	3	1	77
Total	273	46	20	6	2	1	3	4	355
Not accepting advertising	79%	78%	85%	67%	50%	0%	0%	75%	78%

Accepting advertising	21%	22%	15%	33%	50%	100%	100%	25%	22%
-----------------------	-----	-----	-----	-----	-----	------	------	-----	-----

Except for the largest publisher, there is an increasing tendency to accept advertising as the size of the publisher — in terms of number of journals published — increases. However, verification of the reports reveals that the numbers for the largest publisher is misleading, as two of three journals answering that they do not accept advertising, actually have advertising on their Web sites. This problem could be a result of editors, not publishers, answering the questionnaire. Editors for larger publishers often will not have anything to do with advertising, which is in the realm of the publisher.

In addition to the 355 journals in Table 2, there were another 22 journals that we could not identify in DOAJ, so they cannot be classified according to publisher size. If we include them in the total, we end up with 21 percent of the surveyed journals accepting advertising. It seems fair to assume that a majority of these 22 journals would have ended in the single journal publisher category — which includes more than three-quarters of all surveyed journals. That would bring the percentage of journals accepting advertising to slightly less than 20 percent.

Even though absolute numbers for medium-sized and larger publishers were small, the survey shows a tendency for small publishers not to accept advertising, while larger publishers are more likely to exploit this source of income [5]. Remembering that the smallest publishers — single journal publishers — are greatly over-represented in the survey, a reasonable estimate for the percentage of journals accepting advertising should lie somewhere between 22 and 25 percent.

Table 3: Articles published in journals accepting advertising or not accepting advertising by publisher size (actual numbers and percentage).									
Publisher size	1	2–5	6–10	11–15	16–20	21–50	51–100	188	Total
Not accepting advertising	77,918	4,676	9,632	1,248	100			305	93,879
Accepting advertising	27,399	1,037	920	750	200	30	40,050	80	70,466
Total	105,317	5,713	10,522	1,998	300	30	40,050	385	164,345
Not accepting advertising	74%	82%	91%	62%	33%	0%	0%	79%	57%
Accepting advertising	26%	18%	9%	38%	67%	100%	100%	21%	43%

If we look at articles, not journals, the picture was similar. All journals were asked to provide an estimate of the number of articles published on the Internet. Any given article may be surrounded by advertising. For larger journals, the numbers corresponded closely but the

numbers for the largest publisher were misleading. For the mid-sized group of publishers the numbers differed, but the absolute numbers were too small to be significant. In total, about 43 percent of articles were published in journals accepting advertising. However, more than half of these were published in three journals in the journal size 51–100 category, influencing the average heavily. If we include articles from 22 journals that we could not identify in DOAJ, and hence have no information about the size of the publisher, 39 percent of articles were published in journals accepting advertising.

The interesting difference — between the percentages based on number of journals and the percentages based on the number of articles — lies in the group of journals published by single-journal publishers. Twenty-one percent of these journals accepted advertising, but 26% of articles published in these journals were published in journals accepting advertising. The difference can only be explained by larger journals (those with many articles) accepting advertising to a larger extent than smaller journals. Table 4 illustrates a tendency in this direction with the percentage of journals published by single-journal publishers accepting advertising increasing as the number of articles in a given journal increases.

Table 4: Journals published by single-journal publishers accepting advertising or not accepting advertising, by journal size.				
Number of articles	Accepting advertising?		Total	Percentage accepting advertising
	No	Yes		
1–250	164	35	199	18%
251–500	30	10	40	25%
501–750	8	3	11	27%
751–1,000	5	4	9	44%
1,001–1,250	2	1	3	33%
1,251–1,500	3	1	4	25%
1,751–2,000	1		1	0%
2,751–3,000	2		2	0%
3,751–4,000		1	1	100%
5,751–6,000	1		1	0%
7,501–7,750		1	1	100%

22,001– 22,250	1		1	0%
Total	217	56	273	21%

As the absolute numbers of journals in the categories of more than 500 articles are small, one should be careful not to draw conclusions based on the data. However, it seems reasonable to associate acceptance of advertising with larger journals in terms of number of articles published.

What are the reasons for not accepting advertising?

Table 5: Reasons for not accepting advertising (multiple answers per journal possible).									
Reason	Publisher size							Total	Percentage not accepting advertising
	1	2–5	6–10	11–15	16–100	188	N/A		
It is our policy not to have advertising.	94	16	7	2	1	1	6	127	43%
Scientific journals should not have advertising.	57	5	4	3			3	72	24%
The potential income is too small to be interesting.	32	5		1		1	4	43	14%
We do not want the extra work associated with advertising.	38	6	1			2	4	51	17%
Our publishing solution does not easily allow	33	3	3			1	1	41	14%

advertising.									
We haven't thought of it.	56	9	3	1			8	77	26%
Other	31	9	1			1		42	14%
								453	
Number of journals in sample	273	46	20	6	6	4	22	377	

Overall, 298 out of 377 journals did not accept advertising. Respondents were presented with a list of possible reasons for not accepting advertising, and had the option of formulating their own reason by choosing “Other”. Some respondents selected more than one reason, so that the number of answers does not equal the total number of journals. Not all journals not accepting advertising provided a reason.

A working hypothesis in this research was that there was a strong non-commercial bias, making advertising undesirable for many journals. The survey confirmed this non-commercial bias, but there were more practical considerations equally, or more, important.

The most common answer (43 percent) was that a given journal had a policy of not accepting advertising. This is essentially a statement of policy. However, 60 of the 127 journals stating this reason provided no other explanation for not accepting advertising. Of the remaining 67 journals, 42 answered that scientific journals should not include advertising in their pages. Nine journals with a policy of not accepting advertising also answered that they had not thought of it.

That scientific journals should not have advertising was given as an answer by 24 percent of journals not accepting advertising. It is possible that some of the 60 journals stating that they have a policy of not accepting advertising may have agreed with this statement. Hence there is support for a working hypothesis that there was a strong non-commercial bias among scholarly journals, but it was not as widespread as one would have imagined.

Practical considerations — income potential too small, extra work or problems with a given publishing solution — each accounted for a substantial number of journals. A total of 98 journals (33 percent) had given one of more of these reasons for not accepting advertising. Many provided other reasons as well.

The “Other” category (14 percent) covered a number of reasons, but was also used to express interest in accepting advertising in the future.

It was surprising that 77 journals (26 percent) of non-advertising journals noted that they had not thought of using advertising as a source of income.

There is a strong sentiment that advertising is inappropriate for scholarly journals, but practical considerations and a lack of knowledge about the potentials and possibilities of advertising were major factors in explaining the attitudes of some journals towards advertising.

What kind of advertising is accepted?

There are various strategies for accepting advertising, differing in income potential, amount of work and possible conflicts of interest. Respondents were presented with a number of different kinds of advertising, and could choose one or more kind of advertising as being relevant to their journal. An “Other” category was also provided for advertising that did not fit into the categories listed in the survey. Altogether, 79 journals participating in the survey accepted advertising in some form, some accepting more than one kind of advertising. Overall, there were 95 replies to what kind of advertising was used. Seventeen “other” answers covered a number of different aspects, with limiting advertising to specific scientific partners (institutions, conferences, journals, products or services) being the most common answer.

Table 6: Advertising selection (number of journals accepting advertising = 79).										
	Publisher size									
Advertising selection	1	2–5	6–10	11–15	16–20	21–50	51–100	188	N/A	Total
We deal directly with firms interested in advertising in our journal.	39	6	3	1	1	1	3		2	56
We are members of one or more affiliate programs.	1		1	1						3
We are members of one ore more affiliate networks like ValueClick, TradeDoubler, and CommissionJunction.	1		1							2
We provide links to books through affiliation with an Internet bookstore like Amazon.	4	1								5
We use Google AdSense.	8	1		1			2			12
Other sources of advertising.	13	3						1		17
Total										95
Number of journals in total sample	273	46	20	6	2	1	3	4	22	377

Given the small size of the sample, we are cautious in drawing any firm conclusions. However, we see that there are two main strategies for generating advertising income — directly working with prospective advertisers and using Google AdSense. Affiliation in various forms was only used by a handful of journals.

It was surprising that directly working with prospective advertisers was the most common way of generating advertising income. More than two-thirds of the journals accepting advertising selected this option (56 journals of 79; 71 percent). This methodology is the most time-consuming and expensive means of generating advertising income, as a given journal needs to invest time both in handling prospective advertisers and managing the practicalities of advertising such as reporting and invoicing a specific advertiser. It is also the kind of advertising that could open a journal to possible conflicts of interest and to potential editorial pressure from advertisers. Nevertheless, this solution provides a given journal control over the nature of advertisements, allowing a journal to exploit its networks and market potential to the fullest.

Google AdSense is quite different from working directly with advertisers. It is simple to implement and has little administrative overhead. However a given journal has no control over what products and services are advertised and what kinds of ads will be viewed by readers. There is little control over income as well.

My advance hypothesis before the survey was that smaller journals would use Google AdSense, while larger journals would deal directly with advertisers. This would be consistent with the administrative resources that one would assume available for journals of different sizes. The survey supported the notion that larger journals dealt directly with advertisers, but surprisingly smaller journals also worked directly with advertisers and did not *en masse* use Google AdSense.

What is the income potential of advertising?

In order to advise journal editors, we wanted to understand the potential for income. We also wanted to see if we could find any connection between journal publishing language, journal size and other factors with advertising income.

We asked for financial information only if journals used Google AdSense. This kind of advertising is probably highly dependent on background variables in deciding income potential. With other forms of advertising there are a number of other variables that would affect income potential. Thus, we saw Google AdSense as the easiest advertising strategy to analyze.

Much to our surprise, no journal using Google AdSense was willing to share financial and statistical information in our survey. Hence, we are unable to report on the advertising income potential for OA journals.



Conclusion

This survey demonstrated that advertising was used to generate income for some OA journals but was not widespread. This was due partly to ideological motives, but also to practical considerations and a lack of knowledge about possibilities.

There was some indication that the tendency to use advertising as a source of income increased with increased size of a given publisher, in terms of the number of journals published, and with increased size of a given journal, in terms of articles published. This could be due to larger publishers having more administrative resources, thus being able to utilize these resources to generate income. It could also be a result of increased pressure from patrons or hosting or co-operating institutions to generate income.

There was some indication that the strategies chosen for generating advertising revenue were not optimal. Strategies placing a heavy administrative burden on journals were favoured over less burdensome strategies. These decisions could reflect a lack of experience about alternatives.

More information about advertising as a possible source of income for open access journals is sorely needed. Further research is needed in understanding the complex administrative behaviors of open access journals and their editors and publishers. 

About the author

Jan Erik Frantsvåg is an economist working at the University Library of Tromsø. He has a lower degree in economics, banking and computer science from the University of Bergen (1985) and has later studied documentation science at the University of Tromsø, where he currently is studying for a Master's degree.

After a career in banking, he joined the finance department of the university administration in Tromsø in 1993. He has held various administrative positions in the finance and computing departments, and at the faculty of humanities. Since 2006, he has been working full-time on open access at the University Library.

He is currently chair of NORA — Norwegian Open Research Archives, a co-operation between the Norwegian Institutional Repositories. This article is a result of his involvement in the Nordic project “Aiding Scientific Journals Towards Open Access Publishing,” where he has been focusing on business models for open access journals.

E-mail: jan [dot] e [dot] frantsvag [at] uit [dot] no

Acknowledgements

The work leading to this article has been funded in part by Nordbib, a funding programme under NordForsk, which is financed by the Nordic Council of Ministers, through the project “Aiding Scientific Journals Towards Open Access Publishing” (NOAP); partly by NORA — Norwegian Open Research Archives (financed by The Norwegian Ministry of Education and Research) and partly by The University of Tromsø.

Notes

1. Solomon, 2008, p. 122.
2. Crow, 2009, pp. 16–20.

3. See, for example, Michael D. Mills, Robert J. Esterhay, and Judah Thornewill, 2007. "Using a Tetradic Network Technique and a Transaction Cost Economic Analysis to illustrate an economic model for an open access medical journal," *First Monday*, volume 12 number 10, at <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/1964/1840>.
4. For a more detailed introduction to advertising possibilities in OA journals, see the NOAP wiki (*Advertising*) or Crow (2009), pp. 16–2.
5. Hindawi, which did not participate in the survey, seems to be a notable exception.

References

Bo–Christer Björk and Turid Hedlund. 2009. "Two scenarios for how scholarly publishers could change their business model to open access," *Journal of Electronic Publishing*, volume 12, number 1 (February), at <http://dx.doi.org/10.3998/3336451.0012.102>, accessed 10 March 2010.

Raym Crow, 2009. *Income models for open access: An overview of current practice*. Washington, D.C.: SPARC, at <http://www.arl.org/sparc/publisher/incomemodels/>, accessed 10 March 2010.

Turid Hedlund, Tomas Gustafsson, and Bo–Christer Björk, 2004. "The open access scientific journal: An empirical study," *Learned Publishing*, volume 17, number 3 (1 July), pp. 199–209.

Nordic Open Access Publishing (NOAP), 2009. "Aiding scientific journals towards open access: Advertising," at <http://www.ub.uit.no/wiki/noap/index.php/Advertising>, accessed 7 December 2009.

David J. Solomon, 2008. *Developing open access journals: A practical guide*. Oxford: Chandos.

Editorial history

Paper received 10 December 2009; accepted 28 December 2009; revised 6 January 2010.



"The role of advertising in financing open access journals" by Jan Erik Frantsvåg is licensed under a Creative Commons Attribution–Noncommercial–No Derivative Works 3.0 Unported License.

Permissions beyond the scope of this license may be available at [janerik \[at\] janeriks \[dot\] no](mailto:janerik@janeriks.no).

The role of advertising in financing open access journals
by Jan Erik Frantsvåg.

First Monday, Volume 15, Number 3 - 1 March 2010

<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2777/2478>

Vanguard, laggard or relic? The possible futures of higher education after the Epistemic Revolution

by Dion Dennis and Jabbar Al-Obaidi

Abstract

The early twenty-first century networked information economy has generated new communicative fields and literacies, and new forms of knowledge production, sociality and creative expression. The emergence of decentralized techno-fields, such as Facebook, Twitter, Second Life and virtual gaming communities, on teaching, learning, institutional hierarchies and sources of authority, presents both problems and opportunities. This article claims that the current moment represents an Epistemic Break in the Academy, and this piece traces some of how this is so. In doing so, we argue that as educational products and experiences contend with other multi-mediated forms of communication, significantly more attention must be paid to the aesthetic, functional and emotional elements of multimedia design creation and modification of course materials, as these materials vie for the attention of Digital Natives. The conclusion suggests both practices and policies needed for higher education to successfully compete for student attention in the current media intensive environment.

Contents

Introduction

The current epistemic break

Epistemic Revolution Factor 1: Disruptive technologies

Epistemic Revolution Factor 2: Post-textual knowledge representation, production and reproduction

Organizational responses to Epistemic Factor 2: The importance of visual and multimedia design

Implications for policy and practice

Conclusion: Vanguard, laggard or relic? The future of knowledge production in the age of distributed networks

Introduction

If we use the yardstick of current demand to assess the state of higher education, the present and near future appears flush for colleges and universities. Applications have ballooned and the percentage of U.S. nationals with college degrees has doubled since the late 1960s. By this measure, all appears well with the organization of services and knowledge on campus. But there are other, less comfortable frames for viewing the current moment. In the wake of steep declines in state funding, intensified global competition, demographic shifts and the effects of

disruptive technologies, are traditional modes of teaching and learning in a transitional moment? Will they be first supplemented, and then displaced by teaching and learning in virtual and networked environments? Recent events suggest that this may be so. For example, the credit crash of 2008–2009 accelerated structural changes as it plunged the global economy into a severe recession. As Wolf has noted, there are a series of predictable concerns that arise in such situations. For example, if education is the “lifeblood of economic growth” because it spurs “creative destruction” through innovation and individual attainment then when the nation-state is under economic and socio–structural duress, occupational and professional classes often ask about what they can do for their country’s status and economy. Concurrently, nation–states often pass legislation and begin projects designed to grow their “creative classes” (after Wolf, 2009). The size and capabilities of professional classes remains an urgent and persistent issue, for most nation–states. How have nation–states and institutions of higher education responded in the recent past?

Prior to the current economic crisis, the curricular and institutional responses of higher education to these questions, in both elite and mass forms, across the globe, have been a mix of three initiatives: First, the (curricular, brick–and–mortar and geographic) expansion of established colleges and universities. The second initiative is the birth and expansion of new private schools. Spanning across both initiatives is the growth in e–learning content and delivery systems. One motive for such strategic actions has been articulated by Jordan’s Queen Rania Abdullah. Discussing the role of education in bridging the aspirational “Hope Gap,” she emphasized the significance of technology in education, via “initiatives such as computerizing education and the establishment of technology centers in isolated and less–privileged areas” (Abdullah, 2002).

But even as the push to increase the numbers and competence of the world’s college and university graduates gains steam, many countries are coping with mismatches between the skill sets of graduates and the kinds of jobs (and/or entrepreneurial opportunities) generated by a global economy, an economy driven by disruptive technological effects. For example, in a number of developing countries, colonial educational systems were installed to produce graduates who would increase the docility and utility of the colonized, for the exclusive benefit of colonizers. Colonial educational systems institutionalized a top–down, bureaucratic, state–centered, asymmetrical set of practices and goals that have been inadequate in responding to contemporary challenges. Recognizing this situation, developing countries have sought to change or reform their educational system to prepare graduates for a turbulent global market. Central to ongoing reform efforts is the drive to foster the innovative, cost–effective use of technology and information. Hence, the frequent emphasis on the connections between innovation and information, as articulated by former South African Minister of Science and Technology, Mosibudi Mangena, who, at the opening of the First Africa 2006 conference, called for “the importance of fostering a strategic African–European partnership in information society technologies ... to optimally harness the potential of knowledge and innovation as instruments to promote sustainable development” (Mangena, 2006).

Central to both education and economic competitiveness is the availability and use of the Internet, and the dynamic assemblages of technologies developed within that platform. A number of factors determine the adoption and use of these Internet–based technologies, at the level of the nation–state. These factors include per capita GDP, political liberalization, cost structure and technical and physical infrastructural support. Given the wide variance in these variables, there’s an uneven continuum of educational and technological development and deployment across the globe. Wide chasms in technological density and competence are

evident between nation–states (from the hyper–technological South Korea to mid–level penetration in the U.S. to technologically backward states, such as Myanmar and North Korea). Enormous variance is also normative within almost all nation–states. William Gibson’s aphorism remains an accurate summary of the situation: “The future is already here. It’s just not evenly distributed” (Gibson, 1996).

U.S. and Western European institutional responses to rapid and disruptive change has been variable, sometimes disastrous, not infrequently the subject of critiques. We add our voices to the mix below.



The current epistemic break

In this paper, we argue that current conditions for the Academy represent an epistemic rupture, a term coined by Gaston Bachelard, and used by many others, including Foucault and Bourdieu. As Bourdieu and Wacquant put it,

“Epistemological Rupture [consists of] the bracketing [off] of ordinary preconstructions and the principles already at work in these preconstructions. [The term] presupposes a rupture with modes of thinking, concepts and methods that have every appearance of common sense ”
(Bourdieu and Wacquant, 1992)

And what are the current preconstructions? Network theorist Yochai Benkler puts it this way:

“The decision point is whether we will have a much more radically [and globally] distributed capacity to create knowledge, information and culture, and participate in the creation of knowledge, information and culture, or whether we will have a replicated and [tweaked] industrial structure to information and knowledge production. [This] 20th Century [industrial] model [has been] relatively highly capitalized in contractual and hierarchical relationships within firms ... based ... on the sale of information and culture as goods, with a small number of players controlling a relatively limited set of creators, a stark separation between producers and [relatively passive cultural] consumers

[We] are now ... in a much more permeable and fluid ... cultural environment where the difference between producers and consumers is much more blurred, while this [preconstructed industrial–era] category of users [remains] central to everything we do” (Benkler, 2009)

Given the legacies of colonialism and industrialism, the need to reshape hierarchical systems of education based on class, caste and obsolete rituals of subordination, in the South (or to tackle the legacies of organizational industrialism, in the North) matters if these educational institutions are to transcend what are now clearly maladaptive legacies. Or, alternatively, after Benkler, we could phrase our concerns differently, as follows. Do our children face a future where traditional discourses and practices (such as lecture-and-text-based instruction, delivered by content experts, and at specific times in buildings that require physical attendance) have been but minimally adapted to accommodate new technologies? And, if so, will such minimal adaptation create an educational experience that reinforces entropy (after Benkler, 2009)? How educational practices and institutions respond to socio-technical change may well make all the difference between a future that is productive and sustainable and one that is dystopian. The forces at play can be described, albeit incompletely, as follows.



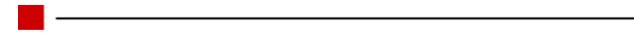
Epistemic Revolution Factor 1: Disruptive technologies

The information revolution, fueled by the increased power of computers and the intensive satellite-based networking of smaller, cheaper, and ubiquitous multifunction telecommunications devices has resulted in (among other things) the mass digitization of texts, sounds and images; all hyperlinked, indexed, consumed and remixed across stable and emerging platforms across the Internet. However, not all of these innovations are truly disruptive. For example, the process (and product) of publishing an article remains substantially identical to print submission processes, albeit the publication's format has moved to HTML or PDF. Cope and Kalantzis note that

“... the Internet-accessible PDF file makes journal articles widely and cheaply accessible, but its form simply replicates the production processes and social relations of the print journal: a one-way production process which ends in the creation of a static, stable restricted text and still image [This] shift, large as it is, does not produce a change in the social processes and relations of knowledge production” (Cope and Kalantzis, 2009)

As Cope and Kalantzis rightly claim, initially, new technologies are routinely deployed to do old things in new ways. (for example, in U.S. classrooms, PowerPoint presentations replaced Kodak slide carousels in the 1990s). These adaptations are not disruptive. However, just as repressive and/or risk-averse governments attempt to intensify traditional modes of surveillance and control via these new technologies of control and visibility (at the same time “the street finds its own uses for things” — Gibson, 2004). New unintended uses for technologies may disrupt established orders. New applications or assemblages of technologies may empower democratic voices, as was the case when wireless networks were instrumental in organizing and reporting on the 2009 Iranian post-election protests. *What is disruptive about new technological ensembles is their still emerging capacity to create, represent and transmit traditional and new objects of knowledge in post-Gutenbergian formats* (beyond how late twentieth century text has been, over the last several generations, increasingly supplemented by radio, television, film, VHS and DVD video products). Early twenty-first century forms and formats are different

because they produce, utilize and share of new forms of knowledge–representation, unrepresentable in traditional formats: *Interactive video, virtual models created, reassembled, reused and modified by faculty and students, often in simultaneous rhythms, 3–D displays of concepts and data.* Already ubiquitous in mass–market communication products that are integral parts of student life (such as interactive video games, iPhones and virtual worlds, such as Second Life), *traditional pedagogical formats, constrained by place, temporality and text, may soon be seen as an increasingly antique regression,* particularly among better–heeled contemporary college students. This possible perception of growing irrelevancy of traditional modes of content–delivery is linked to Epistemic Revolution factor Two.



Epistemic Revolution Factor 2: Post–textual knowledge representation, production and reproduction

An Executive Summary from a 2009 *Chronicle of Higher Education* research paper reports that

“... the traditional model of college is changing ... hybrid class schedules with night and weekend meetings ... online learning ... [part–time] study, tak[ing] courses [concurrently] from multiple [colleges and] universities The full–time residential model is getting too expensive

Students will increasingly expect access to classes from cellular phones and other portable computing devices ... [They] may opt to monitor class meetings online and attend whenever they want Classroom discussions, office hours ... lectures, study groups and papers will all be online Colleges will need to offer [these options] in addition to face–to–face instruction” (*Chronicle of Higher Education*, 2009)

None of this should be surprising, if you consider the following facts about the media predispositions among 18–to–24 year–old adults: 89 percent of this demographic, in the U.S., are online. And, 12–24 year–olds, spend 4.5 hours a day viewing screen media, excluding games (Rideout, *et al.*, 2005; Dretzin and Ruskoff, 2009). Nor is this phenomenon limited to developed countries. For example, Hashem’s study shows that in the Middle East the majority of adolescents use personal multi–function mobile communication devices between 60–300 minutes per day (Hashem, 2009).

Generation M’s “life world” consists of, in no small part, concurrently engaged textual and extra–textual forms of representation, often in dynamic and multiple forms, assembled in novel ways that construct identity and communication in still–developing techno–cybernetic nets of relations and functions (Rideout, *et al.*, 2005). From Facebook to Second Life, and SMSing to YouTubing, the result is a generation that takes a whole set of communicative formats, strategies and artifacts (such as the über–multifunction cell phone) as the foundational ground for identity and communication, in ways that did not exist a few years earlier. In this communicative field, however, traditional strategies for the transmission of knowledge don’t

simply disappear. They are, however, re–framed in a mix of textual, photographic, audio, film and digital formats. When new forms and fields of literacy emerge, they do so in interactive relationships with preexisting representational forms, from text to photography and film. Pedagogical practices can be assembled into powerful mixed–media formats. Media formats and products can be both the medium of instruction and the object of critical analyses. However, such engagements are usually partial and intermittent, at best. Obstacles to fuller engagement consist of the following: First, institutional actors may be risk–averse. New technologies create new risks. Secondly, key institutional actors may value institutional consensus over innovation, particularly during turbulent times, where tamping down anxieties is often paramount. Third, it may well be difficult to incorporate new modes of teaching and learning with existing social and bureaucratic roles and work flows. Fourth, deterred by the learning curve involved with new technologies, novel pedagogical practices are often embraced slowly, retrospectively and to limited effect. Finally, immature technologies may be inappropriately adopted, and the requisite training may be lacking. Overall, these factors retard innovation. Frequently, the result is that engagements with emerging and often novel technological assemblages are opportunities lost. Experiments that might meld new sensibilities with the old are never attempted. To reverse this kind of outcome might well require organizational and perceptual changes not limited to the following.



Organizational responses to Epistemic Factor 2: The importance of visual and multimedia design

“Design should be mastered as a liberal art before it is considered as a business tool. Great design comes from an artistic or cultural impulse [and] starts by creating meaningful stories with a POV, not by building a bulletproof business case. Great design creates new culture [and] is about meaning first, the market second.

Design ... should be human centered, based on observed, real user needs and improve organizational performance. For nonprofits or governments, this means more effective ways to ... serve constituencies ... Design should not operate in a black box: Methods [must be] ... repeatable, predictable, and scalable.

Good design starts with a clear point of view based on facts ... Design should be based on an existing culture ... We challenge our students to experiment, by using hypotheses” (Klinker and Alexis, 2009)

Regardless of how the value of design is conceptualized (as art or commerce), the centrality of design remains unquestioned. Well–designed objects and processes are concerned with maximizing the following qualities: Perceived Ease of Use (PEOU), Perceived Usefulness (PU), security, trust, cognitive absorption and the positive social presence of others. All of these qualities are basic elements for successfully delivery of content (Benbasat and Barki, 2007). For Bruce Sterling, the key aspects of design are specific and well–defined: Well–designed products

and services are functionally transparent, understandable to users, and sport low “cognitive loads” and equally low “opportunity costs” (Sterling, 2008). These are the bottom–line transactional features for Anthony Dunne’s idea of the typical user: “My default mental model of a user is a tortured existential soul [who is] drifting through a complex, technologically mediated landscape” (Dunne, 2006).

In terms of the academic lifeworld, there are at least three major sets of such “users,” so to speak, that are sensitive to these issues of low opportunity costs and equally low cognitive loads, in dealing with the digital design and delivery of information: Faculty, staff and students, although for different reasons. For example, disciplinary Ph.D.s, bound for college classrooms, aren’t taught basic visual literacies and intermediate design skills as a necessary complement to their content mastery. Yet they have an audience of students and institutional clients who grow up enmeshed within expertly designed consumer products and signs, and, as a result, take functional, elegant and design–dissolving behavioral, iconic, and informational environments as a kind of birthright. Not surprisingly, students may well respond negatively to indifferently designed products and services (which include such things as visually illiterate syllabi and multimedia content, as well as poorly designed academic and registration Web sites, including functionally rigid course management systems). Given the large personal, familial, state and societal investment in education, this is not a desirable response, for practical and political reasons, and inevitably leads to the following questions: Where are the obstacles? What factors need addressing?

In part, what the emerging networked, hybrid mediated world has *de facto* produced is an erosion of the boundaries that have separated institutional identities and functions (marketing, public relations, pedagogy, student services, etc.). Discrete disciplinary hierarchies are coming apart, inadequate to the challenge of crafting and delivering high quality multimedia content. This inadequacy is a mandate for organizational adaptations, such as the following:

EF2: Generally, faculty members craft materials in relative isolation. If they require assistance, they get help individually, from technical support personnel. **Instances where course experiences were intentionally and collectively fashioned by teams of Web designers, graphic artists, audio visual personnel, and content providers are (apparently) rare.** While brilliant ideas and innovations often emerge from individuals, the kind of institutional scaling necessary to tweak, harmonize and deploy elegant and effective mediated educational products requires the following:

EF2.1. *Recognize that educational experiences compete with other sorts of intermediated products and services (from entertainment to open source learning), and, as a result, educational content has to be media–rich, intentionally designed, open–ended enough for spontaneity, self–expression and discovery. Content platforms must be crafted by teams, with technical, practical, and artistic input from relevant skilled personnel. This requires changes in professional roles, and a growth in decentralized and horizontal*

systems, as well as in how each stakeholder conceptualizes the relationship to the process, and to other stakeholders. Implicitly, such notions presuppose that effective organizations will have increasingly dynamic and porous boundaries with semi-autonomous workgroups;

This model also assumes testing, independent feedback with beta testers and focus groups, in a process of continuous input, refinement and improvement ...

EF2.2: As Ubuntu Linux founder Mark Shuttleworth makes clear, *“large changes are only possible when [teams that produce these proposals show that new practices] have the potential to deliver radical improvements.”* Goals and outcomes should be compelling enough to entice stakeholders to alter mindsets and routines (Schindler, 2009);

EF2.3: *Differentiation*. In order to claim a real and positive difference, fundamental differences must be simply explained and then concretely embodied. For example, claims such as “We’re a leader in technology and online learning” requires more development than the use of the BlackBoard Course Management System or the mere existence of campus wi-fi. Specific and durable problems must be addressed, such as the infamous “teacher bandwidth” conundrum;

EF2.4. Significant products of the education experience, such as the MIT Open CourseWare initiative, the Social Science Research Network (SSRN), *Wikipedia*, or the Moodle Course Management System (CMS) should be shared with larger communities as a public good.

The opportunities for educational institutions lie in the details of design and content delivery: In *Hertzian tales*, Anthony Dunne makes an important claim: “Design [as a profession and practice does] not engage with the social, cultural, and ethical implications of the technologies it makes so sexy and consumable” (Dunne, 2006). Educational environments could offer rich opportunities for developing good design, exciting possibilities, new fields of sociality, and the ability to save time, and enhance teaching and learning, all while having some fun. Cost, ease, and economic or personal gain, the reasonable extension of trust, and the relative security of these interactions — these are key factors in explaining how everyday artifacts, such as the iPhone, or applications, such as FaceBook or Twitter, become popular. At the same time, the social, political and economic effects of pedagogical and consumer applications can become the target for important critical questions, the kind that Dunne suggests.



Implications for policy and practice

IPP1: Reconceptualize Intra–Institutional Boundaries and Functions: Possibilities within multimedia content delivery allow for experimentation with content production and circulation beyond the hierarchies of disciplines. Institutions have an opportunity to move beyond the “silos” that separate IT, videographers, Web designers, and content providers from the intended producers and consumers of knowledge — engaged student and faculty users. Institutions should emphasize the development of interdisciplinary teams devoted to interactively producing the best experience possible [1].

IPP2: Recognize that it's software, created through community participation. Learn from the success of the open source software movement: Study, learn, create partnerships and recruit (personnel) from some of the spectacular organizational and product successes of this sector. The successes of the Mozilla Foundation's Firefox or South Africa's Ubuntu Linux have important usability and organizational lessons for the Academy [2].

IPP3: Revise definitions of and pedagogy about literacy, creativity, and knowledge production and circulation, to encompass new forms media and communication [3].

IPP4: Teach faculty basic visual design literacies, in Ph.D. programs so that faculty communication products are relevant to the perceptual set of students [4].

IPP5: Develop K–16 teacher preparation modules and professional development classes to enable K–16 faculty and administrators to bridge the mediated epistemological gap between the generations.

IIPP6: Deliberately stagecraft some simultaneous content for production and dissemination through different delivery systems (live–in–person, streaming, video bytes, podcasts, flash videos, etc.) in an integrated way.

IPP7: Ensure that onerous copyright and patent laws do not retard the public production of indigenous and recombinant products and shackle knowledge production, reproduction and circulation. The aggressive expansion of public cultural, scientific and technical communication into corporate property rights (copyright and patents) represents a profound and long–term threat to innovation and growth, particularly for the developing world [5].



Conclusion: Vanguard, laggard or relic? The future of knowledge production in the age of distributed networks

In *Coase's Penguin*, Yochai Benkler discusses how two older forms, managerialism and neoliberalism, for (and explanations of) economic production now share organizational and social space with an emerging early twenty–first century mode of production. Writing in the *Yale Law Journal* in 2002, Benkler called a new, third mode of production “commons based peer production” (Benkler, 2002). “Its central characteristic,” Benkler explains, “is that groups of individuals successfully collaborate on large–scale projects following a diverse cluster of motivational drives and social signals,” rather than responding to management dicta or reacting

to the surface noise of markets. Benkler goes on to explain that information and/or culture has become the dominant product and the necessary physical capital investment for informational productivity (computers, netbooks, the multifunction cell phone) is widely dispersed. The result is that the capacity and the authority to act have been radically decentralized and questions about new forms of legitimate authority emerge (Benkler 2002; 2009).

In a series of articles and lectures, Benkler explains some of the key tensions and questions that this new mode of production brings to higher education in the developed world (Benkler, 2002; 2008; 2009). First, how will institutions effectively negotiate increasingly permeable boundaries with elements of the extra-academic social world, in such a way that extends the range of faculty and student activities while maintaining the necessary academic integrity of institutions? Secondly, how might institutions restrain an indiscriminate administrative risk-minimization reflex, limiting the desire for centralized control when such control may unduly dilute learning experiences or environment? Finally, how will institutions address the technical and design problems content production and delivery, in a manner that acknowledges that higher education has a new role in a world where knowledge production has been decentralized? How to successfully manage these three factors is beyond the scope of this essay, but an acknowledging the importance and significance of these problems is not.

For developing countries, particularly those with incomplete communications and knowledge infrastructures, such problems will post-date more immediate issues, such as providing sufficient infrastructure, affordability, and access. Sandhya Rao describes the current digital divide between the developed and developing world as an issue of structural inequity. For Rao, there's more than enough evidence, generated by scholars working in academic and NGO venues, to conclude "that not having access to new technologies may result in the country lagging behind in socioeconomic development" (Rao, 2009). These inequities limit the social, political and economic lives of billions of people.

For the developed world, the networked information economy, even as it sits upon a severely damaged or even "broken" global economic system, presents new opportunities for colleges and universities. Adapting to widespread changes in communication platforms (such as blogging, vblogging, tweeting) is also an opportunity for mining new ways to enhance and extend in-depth participation of internal stakeholders. For external stakeholders, such as NGOs, governments and corporations, it is a way to engage with formal knowledge communities in a hybrid form of distributed knowledge production known as "crowdsourcing," one of a series of still emerging modes of cultural and communicative action, authority and creativity. These ways must extend far beyond the "command-and-control" habits of IT design and implementation (Whitworth and Friedman, 2009).

For colleges and universities, a sustained commitment to flexible and expert design, testing and implementation of online formats, informed by the successes of the open source movement, and consistent with Sterling's notion of producing communication formats with low cognitive loads and low opportunity costs, **is the critical task**, once infrastructure is in place. Flexible communicative vehicles may well be known by their fruits. They facilitate collaborative efforts that allow participants to be both active consumers and producers. As might be inferred from the success of South Africa's Ubuntu Linux, ambitious design projects may well require a strong and responsive executive, one that exercises power in such a way as to create opportunities for collaboration and creative and productive action from the edges of an organization (Whitworth and Friedman, 2009).

Engaged in a collective reimagining of the present and future, creative collaboration is our best chance to leave a positive legacy. We cannot allow our children to live in the heavy detritus of outdated practices and platforms. As official institutions of cultural production and reproduction, colleges and universities could be part of the vanguard, watching, listening, recognizing, inventing, redeploying and extending new practices and platforms, all the ensembles that are so evident in the everyday communication practices of the young. But institutions can take other routes, such as taking the role of the laggard and “playing it safe,” while extra-educational institutions or collective actors take the necessary risks and reap the rewards. Or, alternatively, colleges and universities might resist the accelerating pace of change, risking relevance and ultimately, viability. Our educational institutions, are they in the vanguard? Or are they laggards? Or, worse yet, are they devolving relics? If William Gibson is right and the future is already here but not evenly distributed, all three outcomes are already present, although unevenly dispersed across and within nation-states. Our productive future is tied to recognizing, embracing, interrogating and designing appropriate and responsive communicative platforms that incorporate the productive potentials of disruptive technologies. Collectively, we can design, test and implement platforms of freedom, cooperation, dialog and inclusion. Or we can design platforms of exclusion, defending formats that are rigid, backward in generationally specific ways, unresponsive and monologic. The values incorporated into design and implementation processes and embodied in communicative routines, are exercises in power. As a generation, we will be judged by what potentials became manifest, and what potentials remained latent, on our watch. Let us leave an open, active and exciting communicative field to our children, to our students, to the future. 

About the authors

Dion Dennis is an associate professor of criminal justice at Bridgewater State College (Mass.). He teaches courses on emerging technology, new forms of property and equally new forms of social control; neo-liberalism and twenty-first century policing and corrections; and, justice, media and crime. His essays and reviews have appeared in *CTHEORY*, *Postmodern Culture*, *Education Policy Analysis Archives*, *Academic Exchange Quarterly*, *Rhizomes*, *Culture and Agriculture*, *Fast Capitalism*, and *First Monday*, as well as in new and reprinted form in several print anthologies.

Jabbar Al-Obaidi is an associate professor of communication studies and media technology, chairperson of the department of communication studies of Bridgewater State College, and the coordinator of the Middle East Studies Program. His research focuses on media and culture, instructional technologies, media literacy, media ethics and practices, teaching and learning in the age of digital media. He is the author of *Media censorship in the Middle East* (Lewiston, N.Y.: Edwin Mellen Press, 2007). His interest also includes producing documentary films. He teaches undergraduate course in the area of media and communication theories, media technologies, methodologies, and intercultural communication. He also teaches a graduate course of communication, information, and management.

Acknowledgments

Thanks to Virginia Rivard for her valuable editorial comments, as well as for her editing and proofing.

Notes

1. The Open University in the U.K. has institutionalized this approach, in the form of the OU Learning Design Initiative. A participant, Andrew Brasher, in his blog, describes and defines the object and processes, in part, as follows: “Designing learning activities is inherently messy, creative and iterative, and that choosing the best combination of tools, resources and tasks for a particular context is difficult ... In the Open University ... design is typically carried out by teams composed of people with a variety of specialist skills including academics, programmers, graphic designers, editors and project managers.” See the blog entry “CAL ’09 Poster Text,” at <http://www.open.ac.uk/>.

Additionally, a graphical and process-oriented representation of Brasher’s text is also available at <http://www.open.ac.uk/blogs/brasherblog/wp-content/uploads/2009/03/vis-process-v8-a0.pdf>, as part of a discussion and evaluation of the learning design platform, CompendiumLD (<http://compendiumld.open.ac.uk/>), which one of three strands of work undertaken by the OU Design Initiative. Finally, for an extensive and impressive slide show presentation on the OU Learning and Design Initiative process and its successes and problematics, see <http://www.slideshare.net/guestf8fbe7/ou-learning-design-initiative-presentation>.

2. The open source movement has several important lessons for academia and the developing world. These are as follows: A. Open source projects and practices are often relatively decentralized and democratic. Large projects, such as Ubuntu Linux, already incorporate design teams as the constitutive element of production and testing. (Therefore, they can model and adapt pre-existing organizational forms practices for academia). B. Open source efforts often exhibit what Benkler calls a new mode of production, “peer-based commons production.” At this historical juncture, arguably, this is the sector that is most innovative. Peer-base commons production has also been resistant to the stasis that comes with monopoly and command-and-control organizational forms. For the pedagogy of active learning, “peer-based commons production” also holds considerable promise as a methodology: Students actively working on “real-world” projects in a collaborative manner, within burgeoning social networks. These may even be platforms that they have created or extended, as students. (Consider the birth and development of Facebook).

C. For the developing world, open source models have already produced a rich variety of customized Linux distributions (usually from the base of a major distribution), tailored to the local linguistic, cultural, religious and technological context. With this preexisting phenomena in place, we can reasonably anticipate that the ethnocentric coding of one culture’s mapping onto learning platforms, icons and processes will be supplanted by platform, interface, process and content modifications that are suited for specific cultural and technical ecologies. D. Open source platforms often *de facto* encourage resource independence, weaning developing countries from the quasi-colonialism inherent in expensive product licenses and/or widespread software piracy. They may well run on less resource-intensive hardware, extending the life of hardware, enhancing sustainability, creating support positions (paid and unpaid) and buttressing nation-state identity (the last can be seen in such phenomena as the Turkish Linux distribution Pardus). Finally, they have the promise of extending the possibility of learning into areas underserved by educational institutions, if telecommunications infrastructure continues to expand.

3. This is a project well underway in the E.U., with countries such as Norway taking the lead in legally defining new literacies and competencies. The experience in the U.S. is decidedly more

mixed, with a palpable ambivalence on many college campuses, where there is a broad Boomer-based class of the professorial and administrative “Teyve’s” who actively resist revising and expanding definitions of literacy.

4. A similar ethos is embedded in part of a mission statement on the Open University Learning Design Initiative site: “Our methodology consists of four interconnected facets: understanding design — through gathering empirical evidence about design, visualising design — as a means of articulation and representation, guiding design — through appropriate scaffolds and support, and sharing design — to inspire and encourage uptake and reuse.” See <http://ouldi.open.ac.uk/research.html>.

5. The tussle between global corporate quasi-monopolies and the “creative destruction” that is often the product of open source efforts has many implications for the global production and circulation of knowledge. The consequences are complex, contingent and still unfolding.

References

Queen Raina Abdullah, 2002. “Closing the ‘hope gap’,” from Queen Raina Abdullah’s Royal Jordanian Web page, at <http://www.queenrania.jo/>, accessed 9 August 2009.

Y. Benkler, 2009. “The end of universal rationality: A talk with Yochai Benkler,” *Edge*, number 279 (March), at http://www.edge.org/3rd_culture/benkler09/benkler09_index.html, accessed 2 June 2009. A video of the interview is also available on the *Edge* site.

Y. Benkler, 2008. “The university in the networked economy and society: Challenges and opportunities,” In: Richard M. Katz (editor). *The tower and the cloud: Higher education in the age of cloud computing*, at <http://net.educause.edu/ir/library/pdf/PUB7202.pdf>, accessed 4 June 2009.

Y. Benkler, 2002. “Coase’s penguin, or Linux and the nature of the firm,” *Yale Law Journal*, at <http://www.yale.edu/yalelj/112/BenklerWEB.pdf>, accessed 6 June 2009.

I. Benbasat and H. Barki, 2007. “Quo vadis, TAM?” *Journal of the Association for Information Systems (JAIS)*, volume 8, number 4, at <http://iris.nyit.edu/~kkhoo/Spring2008/Topics/TAM/000BenTAMarticle.pdf>, accessed 7 August 2009.

P. Bourdieu and J.D. Wacquant, 1992. *An invitation to a reflexive sociology*. Chicago: University of Chicago Press.

Chronicle of Higher Education Research Service, 2009. “The college of 2020: Students: Executive Summary” (June), at <http://research.chronicle.com/asset/TheCollegeof2020ExecutiveSummary.pdf>, accessed 9 August 2009.

B. Cope and M. Kalantzis, 2009. “Signs of epistemic disruption: Transformations in the knowledge system of the academic journal,” *First Monday*, volume 14, number 4 (April), at <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2309/2163>, accessed 1 June 2009.

- J.A. Douglas and R. Edelstein, 2009. "Whither the global talent pool?" *Change Magazine* (July/August), at <http://www.changemag.org/July-August%202009/abstract-talent-pool.html>, accessed 1 June 2009.
- R. Dretzin (producer) and D. Rushkoff (correspondent), 2009. "FRONTLINE: Digital nation," *PBS.org*, at <http://www.pbs.org/wgbh/pages/frontline/digitalnation/us/>, accessed 9 July 2009.
- A. Dunne, 2006. *Hertzian tales*. Cambridge, Mass.: MIT Press.
- M. Foucault, 1994. *The order of things: An archeology of the human sciences*. New York: Vintage.
- W. Gibson, 2004. *Neuromancer*. 20th edition. New York: Ace Books.
- W. Gibson, 1996. "Hackers," In: *Burning chrome*. New York: Ace Books.
- M.E. Hashem, 2009. "Impact and implications of new information technology on Middle Eastern youth," *Global Media Journal*, volume 8, issue 14, at <http://lass.calumet.purdue.edu/cca/gmj/sp09/gmj-sp09-hashem.htm>, accessed 9 August 2009.
- S. Klinker and J. Alexis, 2009. "Design versus innovation: The Cranbrook/IIT Debate," *Cranbrook Design*, at http://www.cranbrookdesign.com/index.php/topics/more/design_vs_innovation_the_cranbrook_iit_debate/, accessed 9 August 2009.
- M. Mangena, 2006. "A strategic African–European IST partnership: Knowledge and innovation for sustainable development," opening session of the first IST–Africa 2006 Conference (May), at <http://www.info.gov.za/speeches/2006/06051213151001.htm>, accessed 9 August 2009.
- V. Rideout, D.F. Roberts and U.G. Foehr, 2005. "Generation M: Media in the lives of 8–18 year-olds, Executive summary," Report number 7250, Kaiser Family Foundation, at <http://www.kff.org/entmedia/upload/Executive-Summary-Generation-M-Media-in-the-Lives-of-8-18-Year-olds.pdf>, accessed 9 August 2009.
- S. Rao, M. McBride, S. Gattis, J. Cain and E. Romo, 2009. "Understanding the digital divide in Eastern Europe: A comparative analysis," *International Communication Bulletin*, volume 44, number 2, pp. 6–23.
- E. Schindler, 2009. "Five things Mark Shuttleworth has learned about organizational change," *CIO Magazine* (January), at http://www.cio.com/article/478250/_Things_Mark_Shuttleworth_Has_Learned_about_Organizational_Change, accessed 4 June 2009.
- B. Sterling, 2007. Talk delivered at the Innovationsforum Interaktionsdesign Conference in Potsdam, Germany, on design (March), with video at <http://vimeo.com/769193>, accessed 1 June 2009.
- B. Whitworth and R. Friedman, 2009. "Reinventing academic publishing online: Part I: Rigor, relevance and practice," *First Monday*, volume 14, number 8 (August), at

<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/2609/2248>, accessed 7 August 2009.

A. Wolf, 2009. "Misunderstanding education: Why increasing enrollments can't and won't fix the the economy," *Change Magazine* (July/August), at <http://www.changemag.org/>, accessed 5 July 2009.

K.B. Wurth, 2008. "Endless text: New media technologies in the raw shark texts" (Abstract), from the Electronic Literature in Europe Conference (September), at <http://elitineurope.net/node/60>, accessed 9 July 2009.

Editorial history

Paper received 10 August 2009; revised 22 February 2010; accepted 14 March 2010.



"Vanguard, laggard or relic?" The possible futures of higher education after the Epistemic Revolution" by Dion Dennis and Jabbar Al-Obaidi is licensed under a Creative Commons Attribution-NonCommercial-No Derivative Works 3.0 United States License.

Vanguard, laggard or relic? The possible futures of higher education after the Epistemic Revolution

by Dion Dennis and Jabbar Al-Obaidi.

First Monday, Volume 15, Number 3 - 1 March 2010

<http://www.uic.edu/htbin/cgiwrap/bin/ojs/index.php/fm/article/viewArticle/2629/2480>