

Science and the Internet: Introduction

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The present volume represents a selection of English and German papers from the International Conference “Science and the Internet,” which was held in August 2012 in Düsseldorf (Germany). The conference was organized by the Interdisciplinary Junior Researchers Group “Science and the Internet” (<http://nfgwin.uni-duesseldorf.de/>), which is comprised of the above-named authors of this introductory chapter and the editors of this volume.

The central theme of the conference was the influence of the Internet on various scholarly practices, such as gathering research data, finding relevant literature, presenting research results, communicating with colleagues and students, etc. (see <http://nfgwin.uni-duesseldorf.de/de/cosci12>). It should thus come as no surprise to readers that the volume begins with PART ONE, “**The Internet and Scholarly Practices from a Cross-Cultural Perspective**,” which addresses the changes in scholarly practices that have been brought about by the Internet thus far in a very straightforward manner. The first contribution in PART ONE is concerned with scholarly communication in Germany. In his article “Online Trends from the First German Trend Study on Science Communication,” Alexander Gerber demonstrates that the use of online social media remains a fairly marginal phenomenon among academics in Germany. Reasons for this circumstance, according to Gerber, range from a simple unawareness of such useful research-related Web sites as SlideShare to a fairly negative attitude toward such well-known social media services as Twitter. A somewhat similar conclusion (i.e., that no significant changes have been made so far) is also arrived at in the second contribution of PART

ONE, the article entitled “From Analog to Digital Psychology: Results from Surveys on Information Behavior among German Psychologists between 1997 and 2010” by Hans Bauer, Gabriel Schui, and Günter Krampen. Among other things, the authors assert that in 2010, established subscription-based journals remained the main source of information for German psychologists, whereas open access journals as well as preprint and document servers were rarely used for the purpose of finding relevant research literature. In contrast to the papers by Gerber and Bauer et al., the other two contributions in PART ONE have a narrower focus. The article “How and Why Do Turkish Scholars Use Social Networking Platforms?” by Selva Ersöz Karakulakoğlu and Övünç Meriç compares the attitudes of a group of Turkish natural and social science scholars towards the use of social media in research and teaching. In stark contrast to their expectations, the authors discovered social science scholars in Turkey to be much more positive about social media than their counterparts in the natural sciences. While the latter are of the opinion that social networking Web sites do not support traditional education methods, the former regard them as a natural tool for both teaching and research. The article “Digital History in Portugal: A Survey” by Maria Cristina Guardado and Maria Manuel Borges raises the question as to the extent to which digital tools, such as online prosopographical databases, are utilized in history research projects in Portugal. After analyzing the Web sites of 13 history research units in the country, the authors conclude that the use of digital tools is currently on the rise among historians in Portugal.

PART TWO, “**The Internet and Teaching,**” deals with the opportunities that the Internet offers for teaching in academia. Contrary to the view held by the aforementioned natural scientists from Turkey, Isa Jahnke contends in her article “Informal Learning via Social Media—Preparing for Didactical Designs” that the use of social media in teaching can produce better learning outcomes due to the informal learning potential inherent to social media (as well as the Internet in general). That is, social media utilized in a teaching context can trigger unplanned learning, in the course of which students can find solutions to a number of problems (related to what they are doing in class) outside of formal instruction given by their teachers. The article contains a description of three recent teaching projects that aimed to achieve better learning outcomes through informal learning via social media. The question of whether the use of Web 2.0 tools can improve teaching in academia is also (somewhat implicitly) addressed in the second contribution in PART TWO, Claudia Bremer’s article “Collaborative and Cooperative Text Production in Wikis.” Her study examined several university-related wikis launched and maintained by students of Frankfurt am Main University. The

main finding is that similar to top-down wikis initiated by university instructors, bottom-up wikis initiated by students are also characterized by a fairly slow rate of voluntary text contribution. In other words, students contribute to wikis only when they are required to do so, such as to earn credit points for a course whose instructor insists on using a wiki. A more optimistic conclusion can be found in the article “Fostering Crossmedia Literacy in Formal Educational Contexts: Conceptual Considerations and Case-Specific Results” by Sandra Hofhues, Christian Geier, and Lena Griebßhammer. This contribution focuses on the use of crossmedia (i.e., several media formats: text, audio, and video) in teaching at the university level as a means of promoting media literacy among students. After outlining barriers impeding the use of crossmedia in teaching, the authors proceed to describe their own teaching experiences with crossmedia in the seminar “Crossmedia Ethnological Communication,” taught at the University of Augsburg in Winter 2011/2012, whose participants were required to work with three media formats: text (blog), audio (podcast), and video. Despite the usual students’ criticism that too much work was required for a relatively small number of credit points, the course was by and large positively evaluated by its participants. Finally, the last contribution in PART TWO, Timo van Treeck’s article “Belief(s) in eLearning – Zusammenhänge zwischen eLearning und Lehr-/Lern-Überzeugungen in Lehrportfolios,” asks if there is a connection between university instructors’ educational beliefs and e-learning scenarios practiced by them in their lectures and seminars. In other words, is a university instructor who conceptualizes teaching as “giving” knowledge to students likely to solely upload his or her course materials—such as lecture notes—on the Internet? In contrast, are more interactive e-learning scenarios (e.g., those that involve the use of collaborative text production) more likely to be implemented by university instructors with more collaborative educational beliefs, i.e., those that emphasize social interaction in class and, in particular, students’ independent acquisition of knowledge? On the basis of his analysis of 31 teaching portfolios created by participants of didactical workshops conducted at various German universities between 2004 and 2011, van Treeck argues that e-learning scenarios do indeed to a very large extent depend on university instructors’ conceptions of teaching, especially of their own role as educators.

PART THREE, “**The Internet and Legal Issues,**” begins with the article “Law: Friend or Foe in Scientific Internet Use?” by Michael Beurskens. This contribution demonstrates that ethical beliefs in academia and legal issues very often do not go hand in hand. For example, while in academia, plagiarism is regarded as one of the most severe violations of the rules of good

scientific practice, the law, as pointed out by Beurskens, largely ignores this issue. For instance, the concept of self-plagiarism is unknown to the law. Also, the practice of sending digital copies of an article to colleagues via e-mail is considered acceptable, ethical behavior in academia, despite the fact that publishing contracts typically assign this right to the publisher only, thereby making this practice illegal. An interesting point that Beurskens makes is that instructors in the Faculty of Law at Düsseldorf University believe that their illegal teaching-related actions—such as providing their students with a broad selection of teaching materials (usually in the form of online readers)—are covered by certain exceptions to copyright law and thus are not illegal. While the paper by Beurskens focuses on several Internet-related issues (plagiarism, reuse of content in teaching, open access, and privacy), the second contribution in PART THREE is devoted exclusively to plagiarism. As the title “Do Easily Copied Internet Media in the Library Lead to Plagiarism?” makes clear, Gabriel Gomez’s article attempts to determine whether readily accessible information on the Internet is one of the causes of plagiarism among students in U.S. colleges and universities. As Gomez conjectures, a student who is accustomed to casual copying practices on the Internet (e.g., in the context of an e-mail message or a Facebook post) may easily include copied information in an assignment, thereby committing plagiarism. In addition, according to Gomez, plagiarism can arise from certain misconceptions among students about the nature of information on the Internet and the reasons for citing other people’s work in academic publications. With regard to the former, some students believe that any information that is freely available on the Internet (including information that is only accessible because the university library has paid for it) does not belong to anybody and hence does not need to be cited. As for the latter, some students are simply unaware of the fact that citing in academic publications is a requirement for more than just ethical reasons. The list of references at the end of an article also has a very important practical function, as it serves to familiarize readers with other relevant publications in the same research field. The last contribution in PART THREE, the article “Scientists and Librarians Create an Environmental Toxicology Data Repository” by Deborah Keil and Kenning Arlitsch, is not a classic research paper, but rather an outline of a research proposal aimed at developing an environmental toxicology data repository for the Wasatch Front, a metropolitan region in the state of Utah in the U.S. The article begins with a description of both the geographical and industrial peculiarities of this region, necessitating the creation of such a repository. Thus, according to the authors, a number of factors peculiar to the Wasatch Front (e.g., the presence of major extractive industries and military installa-

tions) contribute to environmental pollution in this area, which, in turn, is very likely to account for significant increases in lung and bronchial cancer, as well as above-average incidences of asthma and autism in the Wasatch Front. As Keil and Arlitsch point out, the major shortcoming of most American environmental toxicology data repositories is that they cover the entire U.S. and thus do not take into account regional peculiarities, such as those of the Wasatch Front. The authors suggest that the new regionally focused data repository that they propose for the Wasatch Front area will help to address many of the health issues listed above and serve as a model for other regional data repositories in the U.S.

It is a well-known fact that the Internet has given rise to new modes of academic communication. One prominent example is Twitter, which is the topic of the first article in PART FOUR, “**The Internet and New Modes of Scholarly Communication.**” The article “Notes towards the Scientific Study of Public Communication on Twitter” by Axel Bruns and Jean Burgess is a methodological paper that describes how public communication on Twitter can be studied. One important approach is hashtag analysis, which has become popular in recent years. As Bruns and Burgess point out, the hashtag-based approach of categorizing tweets along with some other important metrics provided by Twitter (e.g., the status of a tweet: an original tweet, a retweet, a reply, or a tweet containing a URL) can offer important information about interaction patterns during a particular event (such as the most active users discussing the event and the peak of interactive activity during the event). In addition, a researcher can resort to user metrics, which, among other things, can help systematize the typology of Twitter users on the basis of their preferred interactive patterns (i.e., e.g., whether they mainly post original tweets or retweet other users’ tweets). The next two contributions in PART FOUR focus on blogging in academia. In an attempt to establish the main motives behind scholarly blogging, Cornelius Puschmann and Merja Mahrt, the authors of the second paper “Scholarly Blogging: A New Form of Publishing or Science Journalism 2.0?,” conducted a Web-based survey of scholarly bloggers active on the platform SciLogs (<http://www.scilogs.de/>), which contains over 60 blogs. The majority of respondents were found to regard blogging as a means of presenting their fields of research to a general public, rather than as a platform for debating a specific aspect of their research with a relatively small network of peers. This perspective probably arises from the fact that the respondents do not regard their blogs as appropriate outlets for original research. Thus, Puschmann and Mahrt conclude that scholarly blogging has thus far failed to replace traditional scholarly publishing, and it is far from being clear what role, if any, blogging will play in

academia in the future. An answer to this question raised by Puschmann and Mahrt can be found in the following contribution in PART FOUR, the article “Self-Citation of Bloggers in the Science Blogosphere” by Hadas Shema, Judit Bar-Ilan, and Mike Thelwall. The authors demonstrate that blogging about one’s publications (i.e., self-citing them in a scholarly blog) often results in a noticeable increase in the number of downloads of the full texts of these publications (provided that they are freely available on the Internet). The primary objective of the study by Shema et al. was, however, to identify the defining characteristics of self-citers in scientific blogs. For this purpose, the authors analyzed blog posts from the blog aggregator Research Blogging (<http://researchblogging.org/>) and found the average self-citer to be a male who has earned a doctorate and is affiliated with a university or a research institute. With regard to academic disciplines, the largest number of self-citers stems from the field of computer science, although mathematics is credited with the largest number of self-citing blog posts. PART FOUR ends with the article “Semantic Change of the Publication-Concept?” by Alexander Tokar. This paper focuses on academics’ publications lists, which, in contrast to public communication on Twitter and scholarly blogging, cannot be regarded as a new mode of scholarly communication, as they have existed in academia long before the Internet era. Tokar argues, however, that online-based publications lists differ from their pre-Internet counterparts in that the former do not only list scholars’ publications, but also provide digital access (usually in the form of downloadable PDF files) to various publications that they list. Another important difference is that online-based publications lists sometimes include unpublished manuscripts, which, unlike articles in refereed journals and edited volumes, do not qualify as academic publications in the traditional meaning of the term “publication.” Tokar hypothesizes that the concept of academic publication is currently undergoing a semantic change: While a traditional scholarly publication is defined by the semantic feature [quality control through other experts in the appropriate research field] (hence the term “peer review”), an unpublished manuscript is defined by the semantic feature [quality control through the author of the manuscript only].

The point of departure of PART FIVE, “**The Internet and Scholarly Impact**,” is the article “Citations in Web 2.0” by Katrin Weller and Isabella Peters. Its central claim is that scholarly communication in Web 2.0 exhibits several activities that resemble citing in traditional academic publications and thus may also be worthy of consideration as an indicator of the impact of a particular scholar. Examples analyzed by Weller and Peters include retweeting on Twitter, which can be analogized to quoting in traditional publications; bookmarking on social bookmarking services, such as Delicious,

which can be considered an indicator of the interest of a research community in a particular publication / the work of a particular scholar; and citing in the context of a scholarly blog. One of the most interesting findings of this study is that social bookmarking systems cover 28 percent more articles than Scopus, a well-known database of citations for articles in academic journals. According to Weller and Peters, this fact suggests that users of social bookmarking services create a more holistic view of academic authors by means of bookmarking. It is also worth noting that Internet users clearly reward more products of scholarly practice than traditional citations databases, such as Scopus, do. Thus, in addition to academic articles, numerous scholarly blogs (which are, of course, missing from Scopus) are bookmarked. The next contribution in PART FIVE, the article “Google Scholar versus Google Scholar: Among Publish or Perish, Scholarometer, and My Citations, Which Citation Count Tool is Telling Which Truth?” by Ulrich “Tibaut” Houzanme, focuses on measuring scholarly impact with the help of the three tools listed in the title of the article, all of which make use of Google Scholar data. In an attempt to determine which of these tools is “telling which truth,” the author conducted a citation analysis of the thirty most influential information scientists (fifteen from the U.S. and fifteen from the UK). According to Houzanme’s research, Scholarometer proved to be the best tool of the three tools under investigation, followed by My Citations and Publish or Perish. Noteworthy is the fact that Publish or Perish, according to Houzanme, lags considerably behind both Scholarometer and My Citations, as it often requires disambiguation with regard to disciplines and authors’ names. The last contribution in PART FIVE, the article “The H-Index: What Is It, How Do We Determine It, and How Can We Keep Up With It?” by Timothy Ireland, Kathy MacDonald, and Peter Stirling, deals with a well-recognized aspect of information science—the h-index. In particular, the authors suggest an approach to determining the h-index of an individual scholar on the basis of the information contained in different citations databases—Web of Science, Scopus, and Google Scholar. It is well known that the h-index has become a crucial factor in determining tenure and promotion in many academic disciplines. Accordingly, junior researchers in untenured positions in particular may wish to keep track of how often their publications are cited by other researchers in order to be able to update their h-index. The authors of the article propose a citations tracking system meant to enable academics to successfully cope with this task.

The last part of the volume, “**The Internet and the Future of Science,**” dares to explore potential scientific practices of the future. The first contribution in PART SIX, the article “Publishing against the Machine: A New Format

of Academic Expression for the New Scientist” by Adam Sofronijevic, is essentially a plea for scientists to start cooperating with machines (more actively!) in such areas as text production and text comprehension. The paper begins with the interesting observation that the continuous doubling of the corpus of world knowledge has not yet given rise to dramatic changes in scientific communication. In this regard, the article reminds readers of similar claims made in the articles by Gerber and Bauer et al. in PART ONE of this volume. However, what Sofronijevic focuses on here has far broader implications for scholarly practices in the future. Sofronijevic argues that despite the presence of computers and the Internet, human beings are still the ones to produce scientific texts, which, according to Sofronijevic, is deplorable, given that machines are already capable of assisting us with text production. Indeed, conference abstracts and even texts such as the present introductory chapter consist to a large extent of formulaic expressions, such as *this paper argues that...*, *the author raises the question as to whether...*, *the results obtained corroborate our hypothesis that...*, *in stark contrast to the findings of...*, which can easily be added to the database of a machine. It is very likely that in the future, such scientific texts will be produced, at least in part, by machines rather than human beings. The topic “Machines as Scientists’ Practical Assistants” is continued in the next contribution in PART SIX. As reported in the article “Developing Scientific Software: The Role of the Internet” by Aleksandra Pawlik, Judith Segal, Helen Sharp, and Marian Petre, the authors interviewed 27 scientists developing software for various research-related purposes. (These scientists are not professional software developers!) Of 27 interviewed scientists, 24 acquired software-developing skills nearly exclusively by teaching themselves on the Internet. A related finding of the qualitative interviews conducted by the authors is that the Google search engine serves as the most important source of information of which the interviewed scientists make use when they need to fill in gaps in their software development knowledge (such as when dealing with a software bug). Linking these results with the main tenor of Sofronijevic’s paper, one might exclaim: *Yes, we have computers and the Internet, but human beings are still the ones to develop scientific software.* The final contribution in PART SIX addresses the use of videos in science. The article “Öffentlichkeit und Neue Medien: das Projekt „InsideScience“” by Thorsten Greiner, Jesús Muñoz Morcillo, Caroline Y. Robertson-von Trotha, and Klaus Rümmele describes the project “InsideScience” at the Karlsruhe Institute of Technology. The aim of the project is to familiarize the general public with the work of two research groups (also affiliated with the Karlsruhe Institute of Technology)—“Computational Particle Physics” and “Humanoid Robots: Learning and

Cooperating Multimodal Robots”—which, like the project “InsideScience,” are both funded by the German Research Foundation (<http://www.dfg.de>). The essence of “InsideScience” is that junior researchers from the two aforementioned research groups make videos in which they attempt to explain to laypeople (in an accessible manner) what the projects “Computational Particle Physics” and “Humanoid Robots” are actually about. These videos are then posted to popular video hosting platforms, such as YouTube and Vimeo. This openness of “InsideScience” is indicative of an approach to presenting research to the general public that is likely to gain greater popularity in the near future.

Nearly all of the papers in this volume end with a brief summary of the remaining research questions that arise in connection with what has been discovered by the authors. The editors of the present volume thus hope that our book will instigate further important contributions to what will hopefully soon become a new established interdisciplinary field of study—“Science and the Internet.”