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Researchers use of Web 2.0 versus conventional media: perceived advantages and disadvantages

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RESEARCHERS USE OF WEB 2.0 VERSUS CONVENTIONAL MEDIA: PERCEIVED ADVANTAGES AND DISADVANTAGES

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Abstract

In the past years the development of the so-called Web 2.0 established new possibilities to create a collaborative and participative environment. Web 2.0 not only changes private life but also offers new prospects for scientific exchange. Generally, researchers are open and positive towards Web 2.0 and use it very often for their private issues. Contrariwise, Web 2.0 is used only by a minority for their scientific work.

The presented empirical study aimed at a better understanding of researchers' needs and asked academics for the perceived advantages and disadvantages of conventional communication channels compared to Web 2.0. We conducted three focus group interviews with twelve German researchers of different academic levels. By means of a semi-structured interview we asked for the intention as well as for types of usage and examples of conventional media and Web 2.0. Subsequently, we systematically surveyed the participants for the advantages and disadvantages of conventional media versus Web 2.0.

Overall the findings revealed that the participants mainly mentioned conventional media and only a few Web 2.0 services for their daily working routines. Research assistants primarily used Google Scholar and scientific databases. In addition, students had the intention to follow the recommendations of their lecturers for the selection of their information sources in Web 2.0. To stay up to date the participants mentioned conferences and the communication with colleagues or fellow students.

As advantages of Web 1.0 the participants referred to their confidence in the quality, the sufficiency and the establishment of the conventional sources. The main perceived disadvantages of Web 1.0 were the dependence on the mandatory established academic system and the limited participation opportunities for younger researchers. As advantages of Web 2.0 sources they reported about new opportunities of publishing, research exchange and self-presentation. In addition, the participants characterized the services of Web 2.0 as additional opportunities for (heuristic) information search and participation. As disadvantages of Web 2.0 the participants mentioned the limited establishment in the scientific community. Furthermore, the participants were unsure of the quality and the validity of information provided in Web 2.0.

In summary, the new opportunities of Web 2.0 were known and partly used but regarded as incomplete and insufficient because the old established systems were still required. Web 2.0 has the potential to provide faster information, higher actuality and more personalized options. But the lack of confidence in quality and the limited establishment discouraged the participants to use it for everyday work-related purposes. The direct face-to-face interaction (e.g., conferences or exchange with colleagues) seems to be essential for the scientific work and cannot be completely substituted by Web 2.0 so far.

Our results revealed that Web 1.0 and Web 2.0 can profit from each other. The advantages of one mirror often the disadvantages of the other. For the development potential of the Web 2.0 the advantages of the conventional media (e.g. quality) should be considered and integrated.

Keywords: Web 1.0, Web 2.0, Social Web, academic networks.

1 INTRODUCTION AND THEORETICAL BACKGROUND

The term Web 2.0 is used to indicate the innovations and advancements in comparison to the early internet, the Web 1.0. But a clear distinction between Web 1.0 and 2.0 is often not possible. Nevertheless, the categorization in Web 2.0 is usually intended if features like content creation or networking are offered [1]. Popular services of Web 2.0 are Facebook, Twitter or Instagram [2].

In this relation, many authors defined Web 2.0 by its interactive, adaptive, and user-centric character which helps to collaborate and share information and also be passive recipients of knowledge [3] [4] [5] [6]. Similar, O'Reilly [7] referred to Web 2.0 if services combine social networks, tools for communication, collaboration and participation. Procter and colleagues [8] described Web 2.0 in relation to the possibility to consume and to produce information.

A more specific comparison of Web 1.0 versus Web 2.0 is given by Cormode and Krishnamurthy [1]. They declared the users of Web 1.0 as consumers who search, read, and receive information. In comparison, Web 2.0 delivers platforms with innovative technologies and space for content which could also be generated and shared by users. Users were denoted not only as consumers, but also as active content creators. The differences between Web 1.0 and Web 2.0 were also discussed in the scholarly context of web tools. For example, Dron and Anderson [4] described that Web 1.0 is controlled by the teacher or the system. Web 2.0, however, is open to the contribution and input of learners, of external communities, of graduates and also the contribution of students.

The development of Web 2.0 changed not only the private communication but also provides new perspectives for the research community. Generally, researchers are open towards Web 2.0 services and use them very often for private issues [9] [10]. But so far only a minority uses Web 2.0 for scientific work [11] [10] [12]. Even though the interactive character of Web 2.0 has a high potential for the scientific exchange several former studies describes that Web 2.0 has only limited influence on the daily working routines of researchers. For example, Web 2.0 enables the possibility of virtual participation on conferences. However, many researchers still prefer the face-to-face (FTF) exchange on scientific conferences [12] [13]. It seems that FTF communication has still a special importance for the academic exchange that is not fully replaced by Web 2.0.

Many studies have focused especially on the use of social media [14] [15] [16] [17] [18]. Veletsianos and Kimmons [14] described that online social networks had generally influenced interaction and collaboration among individuals and organizations. With regard to scientific work Nicholas and Rowlands [15] found that the use of social media had an impact on the scholarly workflow. Thereby, researchers use social media mainly for collaborative authoring, conferencing, and scheduling meetings. Additionally, researchers seem to prefer generic tools rather than custom-built solutions. Furthermore, Nicholas and Rowlands [15] described that researchers had concerns about the quality of the information extracted from social media and that this information do not replace the existing system of academic publishing. Another study by Budhathoki and Haythornthwaite [16] found that in academic communities members were known (by name) and visible to each other. Through titles and positions the academic hierarchy was still apparent also in Web 2.0. They also found that academics needed for motivation to contribute in online social networks internal strong relations. In addition, at the moment scientific online networks lack the “critical mass” needed to generate a common interest for researchers. In this relation Van Noorden [18] found that academics do not take advantage of social network sites to build up long-term social interactions. By contrast, Chakraborty found [17] that the majority of researchers use social networks such as Facebook or ResearchGate for messages, and to stay up to date.

Overall we can see a growing trend and a potential for scientific practise in using Web 2.0 but up to now there is no fundamental change of established work structures. Most of the reported literature on the academic usage of Web 2.0 concentrated on the academics` use of social media for research or teaching. The findings showed the general challenges of Web 2.0 services for researchers but did not analyse the individual needs and personal preferences of researchers.

The presented empirical study aimed at a better understanding of researcher´s needs and expectations in relation to the use of social media for scientific work. The study focused on the perceived advantages and disadvantages of the use of Web 1.0 versus Web 2.0 in relation to the scientific working life of researchers. In this context the term Web 1.0 refers to conventional communication channels like the simple web search, newsletter or databases. The term Web 2.0 denotes interactive, participatory, and social media sources (e.g., Facebook, Twitter, ResearchGate, Google Docs).

The approach of this study has the advantage that we could focus on the individual viewpoint of the researcher. The comparison of the subjectively perceived differences between Web 1.0 and Web 2.0 could help to identify the potential of the different services for the daily working life of researchers. This approach leaded to a better understanding of researchers` use of web services and did not focus on Web 2.0 offers. In focus group interviews with researchers of different academic levels we asked specifically for the intention as well as for types of usage and examples of Web 1.0 and Web 2.0.

Subsequently, we have systematically surveyed the participants for the advantages and disadvantages of Web 1.0 versus Web 2.0.

The study was initiated by the ZBW - Leibniz Information Centre for Economics which is the world's largest library for economics, with locations in Hamburg and Kiel, Germany. The presented results are only a part of a larger investigation.

The next section of this paper presents the research questions and the methodology of the study. Afterwards, the results and interpretation of the findings are described. The paper closes with a summary and discussion.

2 METHOD

For the presented study, focus group interviews with researchers and students of different academic levels from Hamburg (Germany) were conducted to get an insight into the individual use of Web 2.0 services for scientific work. Focus group interviews are interviews with five to eight participants talking about a special topic. The method helps to provide an insight into attitudes, opinions, intentions and feelings of the participants. The moderated interviews are semi-structured by main questions but are mainly defined by an open frame. Due to the small sample size this qualitative method has no statistically representativeness [19].

The participants were recruited by placards and flyers or were contacted personally face-to-face, by email or by telephone. Each participant received a 20 € voucher from a popular online shop as reward for the participation. In total, three focus group interviews were arranged. The first group consisted of four students (two male, two female; age 24-30). In the second group four researchers (three males, one female; age 29-62) were questioned. Three of them were active in research, one in university teaching. The last group consisted of six students (three males, three female; age 22-32). Every interview was recorded on videotape in the usability laboratory of the ZBW. The usability laboratory consisted of two rooms. The wall between the two rooms had a large one-way mirror. In the test room three video cameras and a microphone were installed. The duration of the interviews was about one and a half hours. During the interviews drinks and sweets were offered in order to foster motivation throughout the session. Before starting with the interview, the participants were explicitly instructed that they should not be polite but honest, and that there are no wrong or right answers. Additionally, participants were informed about privacy issues and that their answers and data would be handled anonymously. Furthermore, each participant had to fill out a questionnaire for the assessment of control variables (age, gender, university affiliation, position, years working at the university, main occupation, discipline and Internet use). An interview guideline with standardized leading questions was used in all interviews in order to assure comparability and equivalence of the interviews. On the basis of the guideline we ask at first for the intention as well as for the types of usage of the different services of Web 1.0 and Web 2.0. Following we asked systematically for the advantages and disadvantages of these named examples and some additional questions for other purposes. The following list provides an overview on the procedure including the leading questions (bold) and the additional indicative questions:

- **Welcome and introduction of the participants**: What are you currently working on?
- **Information research and behaviour** (use of the sources of information and baseline information auf exiting sources of information):
  - How do you get information for your research work?
  - How do you stay up to date in your subject?
  - How do you get aware of new sources of information?

  The participants were requested to write their used sources of information on paper.
- **Perceived advantages and disadvantages of conventional communication channels compared to interactive social media offers:**
  - What do you especially like about your used sources of information, what is dissatisfying?
  - Please write the advantages and disadvantages on paper!
  - Are there any ways you use but don´t like?

The assessed data were analysed in a qualitative way. The qualitative analysis was structured by the leading questions. Additional we constructed inductive categories for topics which were discussed

very extensive by the participants. Due to the method and sample size a quantitative analysis was not reasonable.

Remark: Like mentioned above this paper presents only a selection of a larger investigation. Besides these questions on Web 1.0 and Web 2.0 the study included also some further questions on digital libraries for internal purposes of the ZBW. These additional questions had no relevance for the findings on the academic use of Web1.0 and Web 2.0 and thus, will not be reported here.

3 RESULTS

In the following we present the results of the focus group interviews. Overall there were minor differences between the groups and the answers of students and researchers were partly very similar. Thus, we report the answers of all participants together. Notable differences between students and researchers are explicitly mentioned.

3.1 Usage of Web 1.0 and Web 2.0 for the scientific daily work

3.1.1 How to get scientific information

The interviewed students and researchers showed a somehow different information search behaviour. Students primarily preferred neither Web 1.0 nor Web 2.0 information sources. Their first choice was the personal contact or expertise of their lecturers. They had the intention to follow the recommendations of professors for the selection of their information. If they needed information they visited the consultation hour of their professors or looked into the documents for their seminars. Also the exchange with fellow students was important for students. Additionally, they mentioned the use of Wikipedia and institutional websites (as Web 1.0 media).

In comparison researchers mentioned the Web 1.0 use of specific databases (e.g. EBSCO, SienceDirect) and subject-specific networks as starting point for information search. Furthermore, researchers discussed about the use of synchronous interactive tools and Google Docs. On the one hand they evaluated the use of Google Docs and interactive Tools as useful for their work. On the other hand, they expressed the desire to work independently from Google. Additionally, they discussed asynchronous tools. These tools had turned out to be inadequate because of their poor usability, the lack of incentives and the feeling of being watched.

All participants mentioned the use of the web search by Google or/and Google Scholar, newsletter, library catalogues and scientific journals for their information search.

3.1.2 Stay up to date

To stay up to date the participants (students as well as researchers) primarily preferred the FTF communication with colleagues or fellow students. In all groups Twitter was mentioned and some participants named newsletter as well as RSS-Feeds. The researchers especially described the participation in scientific conferences as very helpful to stay up to date. They regarded virtual conferences negative, because the environment, the framework program and the togetherness or chat of the participants on conferences were very important. Virtually the personal exchange and immediate feedback were missing – only the presentation of research results were possible.

3.1.3 Getting aware of new sources of information

Asked how to get aware of new information sources, at first the students did not mention Web 1.0 or Web 2.0. Once again they pointed out the importance of the FTF exchange with others (professors, fellow students, friends) and that they primarily rely on the recommendations of their professors and lecturers. They reported that the personal exchange with others opens up new perspectives and inspires new ways of working.

Researches discussed about Twitter (see also section on Twitter and Facebook). One researcher explained he used RSS-Feeds in the past to get new information but he was overwhelmed with the flood of information. He started to use Twitter and selected relevant accounts to avoid an overload of information.

3.1.4 Used information sources for the academic daily work

In this task the participants were requested to write down all their information sources. The lists of used sources have shown that the conventional sources Google, Google Scholar, newsletter, library catalogues and professional sources were used by all participants. Students noted also literature references or lists, and unspecific databases as well as blogs of institutions. Researches named additionally subject-specific databases, like for example EBSCO or ScienceDirect. For Web 2.0 sources all participants listed Twitter and Facebook; ResearchGate was noted only by the researchers. Besides Web 1.0 and Web 2.0 the personal exchange with others (via email, phone, FTF, on conferences) was mentioned as an important source by all participants.

3.2 Advantages and disadvantages of Web 1.0 and Web 2.0

In the second part of the survey participants were asked for their opinion on advantages and disadvantages of Web 1.0 and Web 2.0 information channels. First of all, we present the Web 1.0 pros and cons, following by the Web 2.0 results and finally we conclude with a section about arguments about advantages and disadvantages of specific popular services.

3.2.1 General advantages of Web 1.0 sources

The students described the rapid availability of digital full texts as an advantage of Web 1.0 sources. However, the desire for "haptics" was essential for them, i.e., they preferred reading of printed documents (compared to reading the text on the screen). Focusing on printed documents leaded to better concentration. Also the standardized design of library catalogues was mentioned positively by the students. It leaded to an intuitive operation of other catalogues. Additionally, the students mentioned Google Scholar because it helped to get a quick overview about references. It was described as timesaving, location-independent and comfortable because information was delivered directly on screen e.g., by Google Alerts. Also the students appreciated the possibility of advanced search options for users (search by defined fields). The interviewed researchers stated that the Web 1.0 sources were well-structured and would cover special scientific fields.

One of the major advantages pointed out by all groups was the quality aspect of Web 1.0 information channels. Students estimated the quality of the conventional sources as high because they were citable and well-accepted by university lecturers. Also they mentioned the transparency, visibility and citation frequency as an advantage. The researchers explained that Web 1.0 based on established high quality structures. They described the conventional sources as complete and believed that the most significant factor for information research is the relevance and quality of a reference.

3.2.2 General disadvantages of Web 1.0 sources

Students mentioned the dependency on location and time as disadvantages of Web 1.0. For example, some data bases are only freely available on university servers (due to copyright) with limited opening times. They also criticized the outdated versions respectively no digitization of papers or books, missing subject filters, unclear relevance or sorting criteria and the lack of qualitative criteria in advance (e.g. in library catalogues).

Researchers discussed several aspects that were in their opinion negative as well as positive. These results will be reported in the subsection “ambiguous aspects”.

3.2.3 General advantages Web 2.0 sources

Compared to the conventional sources the students estimated the results of Web 2.0 research to be more up-to-date. The Web 2.0 sources were not seen as competing alternatives to conventional media but rather as advantageous extras. Web 2.0 info was described as “information that one wouldn't search for” and “information hardly be found anywhere” (in conventional media). Additionally, students described the personalization possibilities as considerable advantage.

The interviewed researchers called the Web 2.0 sources as “starting point for search”. They especially liked the more personal, democratic and transparent way. Researchers discussed at this point the user-centric character and the undefined structures of Web 2.0 sources. They considered these aspects as positive as well as negative. (Details will be given in the subsection “ambiguous aspects”.)

Moreover, all participants perceived the platforms for cultivating contacts and the broadening of the communication opportunities as being beneficial.

3.2.4 General disadvantages Web 2.0 sources

Students described the poor usability and the excessive application possibilities of Web 2.0 as disadvantage in view of distraction by surroundings, difficult reading on screen, and mass of information (information overload). These circumstances wouldn´t support an efficient information search. Furthermore, students criticized the low quality of the Web 2.0 sources. They expressed uncertainty in relation to clear and unique referencing, citability and verification of data. Moreover, publication dates, author's attributions, and modifications weren´t traceable documented and archived. An over-use of the personalization possibilities could lead to a limited scope of perception. Students also complained about broken links and required online registration. In their opinion Web 2.0 sources were not used as a substitute for conventional sources. During the discussions also the point was raised that, Web 2.0 sources may involve gaps in security, for example in relation to data protection, privacy issues, and a limited supply of protected areas.

The researchers discussed at this point the user-centric character and the undefined structures of Web 2.0 sources with its pros and cons. This discussion is described in the following section on ambiguous aspects.

3.2.5 Researcher's discussion of ambiguous aspects

In relation to Web 1.0 researchers mentioned that theme-focused search, the existing academic structures and the "science system" had their advantages and their drawbacks. On the one hand, these aspects leaded to a limited scientific perspective and the increased threshold in terms of participation. The "science system" determined who can participate and could exclude those researchers who did not fit into the rigid established structures. Science had its rules and people were bound by these rules. On the other hand, good reasons for these structures were that renowned researchers provide their research within this system and thereby a high quality of information is guaranteed.

In relation to Web 2.0 researches mentioned the user-centric character without defined structures as partly positive and partly negative. These structures are under development without rigid rules or standardized options. This could be seen in a positive sense because it offers chances for participation and innovative ideas. On the other hand, the researchers mentioned the drawback that no information about the validity was available and the user could not rely on given structures.

3.3 Popular services: Specific advantages and disadvantages

In the following section we present the results of specific remarkable discussion points on some important popular services.

3.3.1 Google: all in one solution

Google was intensively discussed by one group of students. They especially pointed out the advantage of the all in one solution of Google. Generally, students were displeased by the vast variety of different web-based online services for work and communication. They were annoyed about the numerous registration requests and lost the overview of all services and functionalities. In this relation they expressed the wish for a web supplier providing one solution to all services – similar to the offer of Google (Google Docs, Google Drive etc.). The students discussed the advantages of using Google as all in one solution, but expressed also their interest in being independent of Google (as the largest provider in the online-market with the danger of a monopoly). The idea of an all in one solution seemed very attractive to them, because they want to get rid of the complexity of different services. On the other hand, they discussed also associated possible problems in relation to data protection, data management and privacy. Furthermore, they negatively mentioned the aspect to mix up private and work-related matter or contacts. They would prefer a solution including the possibility for separation of private and working life. (Researchers did not discuss about this topic in detail.)

3.3.2 ResearchGate

The researchers debated about the academic network ResearchGate in a differentiated way. They appreciated the possibilities on ResearchGate to submit scientific papers for publication and receive feedback via posts or the number of downloads. They considered the self-presentation on profile sites to be most relevant for the user; however, the scientific discussions in the network was less important to them. Moreover, they welcomed the targeted search for publications and the provision of news, references, and specialized information relative to different fields or departments. They described

ResearchGate as enormously helpful to maintain an overview about current research results. In the view of the interviewed researchers, ResearchGate is highly capable to identify the individual interests and to provide information on research and recent developments. This leads to a rapid availability of scientific articles as well as student's papers. The researches claimed that the network has an increasingly relevance for any research business. Moreover, the network could weaken the rigid academic structures. But nevertheless it could not be used as the only source of information because the conventional sources still deliver the essential information. The students did not discuss about ResearchGate.

3.3.3 Twitter and Facebook

One of the issues addressed by all participants (students and researchers) was the use of Twitter and Facebook. Generally, they stated that the information on Twitter and Facebook is not very detailed and reliable but helps to maintain an overview. They described the given information as useful for a preliminary selection, to stay up-to-date, for receiving interesting news and saw a potential to development. All participants considered it as problematic that sources of some information were often not transparent and understandable. Students described therefore information provided via Twitter and Facebook as not reliable and citable. Although the students considered Twitter information as unreliable they made an exception in the case of Twitter accounts of renowned researchers. The information delivered by these accounts had a "quality guarantee". Additionally, the students negatively mentioned the continuous pressure for interaction, communication, and reading. They found it also difficult to select the relevant and reliable information.

In comparison to students, researchers estimated the information on Twitter more positive and used it more often. In this relation, they mentioned for example the scientific exchange during conferences. They stated that the academic use of Twitter is growing and it is becoming more and more important for scientists to participate. Thus, they emphasized that Twitter has the potential of an expert network where highly relevant information is distributed via personal contacts.

4 SUMMARY AND DISCUSSION

Overall the advantages of *Web 1.0* sources included primarily adequate application possibilities (including good usability, e.g., standardized design, print options) and the high quality of scientific information. Also the given established structures were considered as beneficial. The perceived main disadvantages of conventional information sources were the limitation of participation possibilities and the narrow scope of available information.

Subjectively perceived benefits of *Web 2.0* were the possibility to receive extra information as well as the more personal, democratic, and transparent offer for participation and exchange. The high level of distraction, the flood of information, the pressure for interaction and the lack security of Web 2.0 sources were perceived as disadvantageous. In addition, the unclear quality of the information extracted from social media was discussed as drawback. In this relation Web 2.0 was not seen as substitute for the existing system but rather as supplement for conventional media. These findings are in line with Nicholas and Rowlands [15] already presented in 2011 and demonstrated that in the last few years there was no substantial change of the status of Web 2.0 sources for the working life. Generally, Web 2.0 opportunities were known and partly used but regarded as incomplete and insufficient because the old established systems were still required. Web 2.0 has the potential to provide more celerity, topicality, and individualization options. But the lack of confidence in quality and the limited establishment discouraged the participants to use it for scientific research and work-related purposes.

The analysis of *popular services* demonstrated that the participants saw high potential and growing relevance of interactive information services but complained about a lack in data-protection, data-management, and privacy. During the discussion about an all in one solution it became apparent that there was a need for the use of bundling the overwhelming amount of diverse services. This is in line with Nicholas and Rowlands [15] who described the researchers` preference of generic tools rather than custom-built solutions. ResearchGate was mainly used for publications and feedback by the researchers.

Another remarkable finding relates to the importance of *FTF communication*. The FTF exchange with other people was described as very important. It often built the basis for finding the relevant media sources, especially in Web 2.0. Thus, the direct FTF interaction and exchange seems to be essential for the scientific work and cannot be completely substituted by the interactive Web 2.0 so far. Expert

recommendations could lead to Web 2.0 sources but the FTF contacts are the beginning and initializing source. Similar, the participants described the virtual participation at conferences negatively and stated that the (real) participation cannot be completely substituted.

As a *general résumé* our results revealed that Web 1.0 and Web 2.0 can profit from each other. The advantages of one mirror often the disadvantages of the other: The high quality of scientific information, good possibilities of application, establishment of the structures were main advantages of Web 1.0 and at the same time the main disadvantages of Web 2.0 for the work-related usage. For the development potential of the Web 2.0 the advantages of the conventional media should be considered and integrated. On the other hand, Web 1.0 could benefit by implementing Web 2.0 advantages like up-to-dateness, personalization options as well as democratic, open, and transparent structures. Besides the described advantages and disadvantages of Web 2.0, the recommendations of experts such as professors seem to be essential for the identification of high quality sources and could be a useful supplement of Web 2.0 services. Another interesting finding was the desire for an all in one solution for daily work routines. Google was discussed as an example how this could be managed and complexity could be reduced. But a big problem of Google (that should be avoided) is the aspect of data-protection and privacy purposes and the separation of private and business matter.

Our empirical study provides first useful insights in the subjectively perceived advantages and disadvantages of conventional media versus Web 2.0. However, we interviewed only a small number of participants from a limited number of disciplinary settings and academic backgrounds. Further systematic studies on the working routines of researchers and their use of Web 2.0 and new technologies are needed to receive more detailed conclusions on the academic use of Web 1.0 and Web 2.0.

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