

Volume 10
Number 2
2010

Studies
in Communication
Sciences

*Journal of
the Swiss Association
of Communication
and Media Research*

Università della Svizzera italiana (USI)
Faculty of Communication Sciences



SGKM

Schweizerische Gesellschaft
für Kommunikations- _____
und Medienwissenschaft _____

SSCM

Société suisse des sciences
de la communication _____
et des médias _____

SSCM

Società svizzera di scienze
della comunicazione _____
e dei media _____

SACMR

Swiss Association _____
of Communication and _____
Media Research _____

THOMAS N. FRIEMEL & SARA SIGNER*

Web 2.0 Literacy: Four Aspects of the Second-Level Digital Divide

The diffusion of the Internet is reaching a level of saturation with around 80 % coverage in Switzerland and Germany and more than 90 % coverage in northern Europe. However, the decrease of the first-level digital divide is not equivalent to an egalitarian use of Internet applications and content. A major change in recent years has been the increasing importance of user-generated content and so-called Web 2.0 applications. Due to this development, it became particularly important to consider the productive aspect of Internet use, both in theoretical concepts and empirical research on media literacy. The concept proposed in this article distinguishes four aspects of Web 2.0 literacy in a two-by-two matrix. On one dimension we identify receptive and productive acts of communication and on the other dimension knowledge and use. The empirical test of this concept (N = 266) illustrates the importance of distinguishing between these four aspects of Web 2.0 literacy.

Keywords: ICT literacy, digital divide, operationalization, survey.

* Universität Zürich, th.friemel@ipmz.uzh.ch; s.signer@ipmz.uzh.ch

1. Introduction

Diffusion of new technologies like the Internet and its various applications is not a random or egalitarian process. Socioeconomic cleavages account for digital divides on different levels. On the first level there exists a divide between people with access and those without access. Empirical research found the first-level digital divide with respect to countries (Norris 2003), gender (Stolzenburg & Bahl 1999; Departement for Culture, Media & Sport 2001: 2) migration background (Fairlies et al. 2006: 16) and various other socioeconomic characteristics such as education¹ and age (BBC 2009: 3) (see section 2.1).

Aside from this access divide another gap can often be observed on a second level (Hargittai 2002; Zillien 2009). The second-level digital divide describes differences with respect to the content and devices used on the Internet. As the access gap closes, the research focus shifts to these usage gaps. Addressing the individual abilities of ICT use (ICT literacy), this line of research converges with the research tradition of media literacy which dates back to research on the use of books (Kirsch 1995) and television (Mikos 2007: 41; Theunert 1995: 50).

The second section of this paper provides an overview of previous research and major findings on the topic of digital divide, ICT literacy, and Web 2.0. Based on the literature review in the subsequent section (three) we propose a systematic operationalization of Web 2.0 literacy which differentiates four distinguished aspects in a two-by-two matrix. On one hand we discriminate between receptive and productive acts of communication, and on the other hand between knowledge and use. The aim of the empirical part of this article is then to examine the following research questions:

RQ1: Is there an individual need to use the Internet as an alternative information source to classic mass media?

RQ2: What is the proportion between receptive and productive use and how does it differ between important Web 2.0 applications?

¹ <http://unescochair.blogs.uoc.edu/11062008/fighting-against-the-digital-divide-trough-education/> [26.10.2009]

RQ3: Do knowledge and use of receptive and productive aspects develop simultaneously while people get more experienced with the Internet?

This paper focuses on a setting in which the existence of the first-level digital divide has mostly disappeared and the second-level is starting to be of special interest. Therefore, the empirical setting described in the fifth section includes students of mass communication and media research in Switzerland and their use of typical Web 2.0 applications, e.g. blogs and Wikipedia. The empirical results in section six indicate significant differences in the Web 2.0 literacy of the students for the two applications under study. The findings suggest that usage gaps are not necessarily based on knowledge gaps (discussion and conclusion in section seven and eight).

2. Digital Divide, Web 2.0, and Media Literacy

This section addresses four aspects of the topic under study. First, research on digital divide, second, research on media literacy and ICT literacy, third, the normative perspective on media literacy and finally Web 2.0 and its characteristics.

2.1. Digital Divide

As mentioned in the introduction, academic research first focused on the so-called first-level digital divide which separates people with access to computers and the Internet from those without access. Hence, the origin of the term dates back to the mid 90s when the diffusion of the Internet increased its pace (Rice 2006). Digital divides have been found on an international level leading to the overall conclusion that there is a replication of “traditional” inequalities between rich and poor countries in the cyber world (Norris 2003; Zillien 2009). Within western societies it has been found that diffusion is strongly affected by classic forces of technological diffusion such as socioeconomic factors, age, and gender (Baker 2001; Warschauer 2002; Cho et al. 2003). A recent study in the UK revealed a distinctive profile of Internet users and non-users. Seventy-six percent of the non-users are non-working (retired, not working owing to a long-term illness, housewives/husbands, unemployed or pursuing full-

time education). Sixty-nine percent are older than 55 years, 49 % have no formal qualifications, and offliners normally belong to lower socio-economic groups (BBC 2009). Similar situations exist in other European countries (Internet World Stats 2009).

The insight that a good communication infrastructure is a crucial asset in the western media society has led to various governmental initiatives. With respect to the educational sector, US research addressed the differences between rich and poor schools and the national initiative E-Rate to overcome this inequality. In Switzerland, where the present study was conducted, there are hardly any differences between schools. First, there are only a few private schools and small financial gaps among the public schools. Second, the former national telephone provider Swisscom started an initiative in 2001² to provide free broadband access to all 5,000 schools in Switzerland. This initiative was recently expanded to include the pre-school level.

Today it can be concluded that the first-level digital divide is decreasing in western societies, although a part of the population remains offline. In 2009, when we collected the data for this study, 90 % of the Swiss population under the age of 35 had Internet access in the household (FSO 2010a). In combination with the availability in schools and at the workplace, more than 90 % of all 14 to 19-year-olds used the Internet several times a week in 2009 (FSO 2010b).

2.2. Media Literacy

In media society, media competence is considered a “key qualification” a “fundamental qualification” or a “general practical skill” (Vollbrecht 1999; Duncan 2005). Media competence is mostly discussed in pedagogy, but the term is also used in many other contexts (e.g. science, politics, economics) (Jarren & Wassmer 2009; Sutter & Charlton 2002). As a result, there are many abstract definitions and concepts of media competence, each highlighting a different aspect of the term. For example, media competence should comprise cognitive, analytical and evaluative skills or knowledge about structures and programs of various media, which are

² <http://www.swisscom.com/GHQ/content/SAI/?lang=de> [26.10.2009]

to be appraised and assessed critically (Kübler 1997). Media competence also demands the ability to select information, to decode symbols, and an intuitive ability to change media (Glottz 2001). Within the Anglo-American sector, one speaks of media literacy (Livingstone 2003) while in the German literature the term *Kompetenz* is used. In this paper we use the term literacy and Web 2.0 literacy, respectively, because this contribution focuses on Web 2.0 applications such as Wikipedia, YouTube and blogs.

As basis for our theoretical concept of Web 2.0 literacy, 21 concepts and definitions of media literacy, which are often cited and/or used in programs promoting media literacy in German-speaking countries, were analysed. In an inductive process a schema with five aspects was developed (see Table 1). These aspects can be regarded as the core of the concept *media literacy* as it is used in Switzerland, Germany and Austria: media use, media knowledge, media design, media criticism, and social/communicative competence.

Table 1: Example of Inductive Categorization

Aspect	Dimensions mentioned by Baacke (1997)
media use	<ul style="list-style-type: none"> – Media use – Receptive media use: Ability to use TV programs – Interactive media use: Interactive use of services (e.g. Ebay)
media knowledge	<ul style="list-style-type: none"> – Media knowledge (knowledge about media) – Knowledge about modern media and media system (e.g. What is a dual broadcasting system) – Ability to use media (e.g. technical use)
media design	<ul style="list-style-type: none"> – Media creation (create creative and technically difficult media content) – Innovative media creation (further development of the media system) – Creative media creation (creative design, which goes beyond the particular media system and its frame)
media criticism	<ul style="list-style-type: none"> – Media critic (to bring media offer into question) – Analytic media critic: reflection of problematic social processes (e.g. concentrations processes) – Reflexive media critic: reflection on own media knowledge and media action – Ethical media critic: ethical judgment and social responsibility of media and one's own media action

Table 2 shows which aspects are included in the various concepts. The frequencies provided give an idea of how widely used the aspects are. Media knowledge and media criticism seem to be especially important aspects while media use and social/communicative competence are less central.

Table 2: Overview of Categorization of Concepts of Media Literacy

	Aspect				
	media use	media knowledge	media design	media criticism	social/communicative competence
Aufenanger 2003		x	x	x	
Baacke 1997	x	x	x	x	
Blömeke 2000		x	x	x	
Dewe & Sander 1996		x			x
Gapski 2001		x	x	x	x
Groebl 2001	x	x		x	x
Groeben 2002	x	x	x	x	x
Hillebrand & Lange 1996		x		x	x
Kubicek 1999		x		x	
Kübler 1999		x		x	
Lange 1999	x			x	
Moser 1999		x		x	x
Pöttinger 1997	x	x	x		
Schell 1998	x	x	x		
Schorb 1998		x		x	x
Schulz-Zander 1997	x		x	x	
Spanhel 1999					x
Sutter & Charlton 2002		x	x	x	
Theunert 1999	x		x	x	
Thiele 1999		x	x	x	
Tudolziecki 1998	x	x	x	x	
<i>Frequency</i>	<i>9</i>	<i>17</i>	<i>12</i>	<i>17</i>	<i>8</i>

Empirical studies based on these concepts of media literacy remain the exception (Treumann 2002, 2007). With respect to specific media devices like the Internet, more empirical studies can be identified. However, these studies use rather pragmatic literacy concepts like self-perceived skill (Hargittai 2005), familiarity with Internet-related terms (Hargittai 2008), and self-efficacy (Eastin & LaRose 2000). These studies provide interesting insight into independent variables which have an influence on the so-defined ICT literacy but do not cover all aspects of our concept of Web 2.0 literacy.

2.3. Normative Perspective on Media Literacy

In general terms we can define media literacy as the ability to cope with the individual and societal need for media use. Hence, differences in access or use of new technology are not problematic per se. Their relevance is defined by the two normative criteria of individual or societal need. As a hypothetical example we can imagine a society in which political votes can only be given electronically. All citizens without Internet access or the ability to handle the service would be excluded from the democratic process. Hence, a societal need would be given. The second normative criterion is the individual need. Recently, the BBC unveiled new research findings entitled *Encouraging Home Broadband Adoption*. They found that 73 % of all adults in the UK use the Internet at least from time to time. Of those who do not use the Internet at all, 66 percent say that they are simply not interested in the Internet (BBC 2009). This finding illustrates how important personal interest and individual need can be in explaining media use. In the tradition of the uses-and-gratifications approach we can therefore define media literacy as the ability to use the media in a way to gratify individual needs. Or to be more precise it is the minimization of the gap between gratification sought and obtained (Palmgreen & Rayburn 1979).

2.4. Web 2.0 and its Particular Requirements for Users

The term Web 2.0 is commonly associated with Web applications that facilitate the production of individual online content on the World Wide

Web. What has been lacking thus far is a universal definition of the term Web 2.0 (Stanoevska-Slabeva 2008) because Web 2.0 does not indicate a specific technological innovation but rather the consequent use of available technical means (Kerres 2001).

People continue to spend more time on the Internet. Especially social network sites (e.g. Facebook or Xing), YouTube, Wikipedia, and blogs become more and more popular. Media usage behavior has changed substantially and one can even speak of a new generation of use. In the past, the publication of widely available content (creation of a public space) was limited to classic mass media like newspaper, radio, and TV. On the Internet, all users with the necessary technical knowledge can edit and produce online content and reach a mass audience. The primary characteristic of Web 2.0 is that the technical skills required for active contribution have been lowered to a level which allows ordinary people to create online content. The creation of content has become almost as easy as its receptive use. Therefore, it has become more appropriate to use the term “communication” to describe Web 2.0 applications, as Merten argues in his seminal thesis that reflexivity is a particularly key aspect of communication (Merten 1977: 89). Web 2.0 applications are more interactive than classic mass media although contributors of Web 2.0 content normally do not address a clearly specified audience and the audience is not necessarily responding directly to the sender but again to an unspecified audience. Despite this limitation compared to “pure interactivity” it becomes obvious how crucial it is to take both communicative aspects – receptive and productive communication act – into account for any theoretical or empirical approach on Web 2.0.

3. Operationalization of Web 2.0 Literacy

The five aspects identified in section 2.2 (media use, media knowledge, media design, media criticism, social/communicative competence) were used as the basis for the proposed concept of Web 2.0 literacy. The aspect of “social and communicative competence” was regarded as rather general and thus located on a higher/superior level. Therefore it was excluded from this media-specific concept, which focuses on Web 2.0 applications.

Table 3: Operationalization of Web 2.0 Literacy

		Skills	
		Knowledge	Use
Act of Communication	Receptive e.g. read a blog	<p>Receptive Knowledge</p> <p><i>Factual Knowledge</i></p> <ul style="list-style-type: none"> – How familiar are you with the following computer and Internet-related terms? ... Blog. (familiarity 1–5) – I am confident of my ability to read a Blog. (approval 1–5) <hr style="border-top: 1px dotted black;"/> <ul style="list-style-type: none"> – I have already wondered, why Blogs are written. (frequency 1–5) <p><i>Reflective Knowledge</i></p>	<p>Receptive Use</p> <ul style="list-style-type: none"> – How often do you use the following things online? ... read a Blog. (frequency 6 point scale)
	Productive e.g. write a blog	<p>Productive Knowledge</p> <p><i>Factual Knowledge</i></p> <ul style="list-style-type: none"> – I am confident of my ability to maintain a Blog. (approval 1–5) <hr style="border-top: 1px dotted black;"/> <ul style="list-style-type: none"> – I have already wondered what consequences a personal blog might have for me or others. (frequency 1–5) <p><i>Reflective Knowledge</i></p>	<p>Productive Use</p> <ul style="list-style-type: none"> – How often have you written your own blog (except comments). (frequency 4 point scale)

The three aspects (media use, media knowledge and media design) should be examined on two different levels: The level of use and the level of reflection (media criticism). This way the key aspects are built into the new concept. With particular focus on the Web 2.0 application, a distinction between receptive and productive communication acts is very important. As outlined in the previous section a crucial aspect of all Web 2.0 applications is the possibility as well as the need of user-generated

content. Only few definitions of ICT literacy include the aspect of content production (“creative media use”).

With respect to the subject under study (Web 2.0) we propose to include this aspect in one of two very distinct communication acts, namely receptive and productive. This distinction represents one side of a two-by-two matrix. The other side of the matrix is defined by the skills, which are divided into knowledge and use. Combining the two dimensions with two characteristics we end up with four distinct aspects of Web 2.0 literacy: receptive knowledge, productive knowledge, receptive use, and productive use. Within the two knowledge aspects we can further distinguish between factual and reflective knowledge. However, this differentiation is not dichotom but represents two poles on a continuum.

4. Research Questions

Based on the theoretical reasoning outlined in the previous sections, this paper focuses on three important aspects of today’s Internet use among young adults. A prerequisite to testing these research questions is that all participants in the study should have Internet access (i.e. no first-level digital divide should exist). Even though the first-level digital divide is diminishing, inequalities may still occur even in highly homogenous subgroups of the population. Before the main research questions could be addressed it was first determined whether the assumed closing of the first-level digital divide could be confirmed within the study’s sample population.

Based on the normative approach outlined in section 2.3, Web 2.0 literacy cannot be assessed in absolute terms by a generic skill level or the number of applications and terms familiar to a user. Hence, how important the Internet is as an information source for different topics must still be investigated.

RQ1: Is there an individual need to use the Internet as alternative information source to classic mass media?

This study focuses on content categories found in most mass media like newspapers, TV, and radio and compares the importance of the Internet as an information source relative to these media. Topics include for

example politics and news, sport, music, economics, gossip, and health information. In this paper, the normative perspective of Web 2.0 literacy (outlined in section 2.3) is limited to the individual need following the tradition of the uses-and-gratifications approach. An empirical measurement of the societal need lies beyond the scope of this article.

The second aspect of interest is the relationship between receptive and productive use of important Web 2.0 applications (e.g. Wikipedia, blogs, Youtube, discussion forums).

RQ2: What is the proportion between receptive and productive use and how does it differ between important Web 2.0 applications?

The third research question combines the distinction between receptive and productive use with the other dimension of the proposed Web 2.0 literacy concept (knowledge vs. use). It is of interest how strongly knowledge about receptive and productive aspects of Web 2.0 applications is linked with their use and how this differs between experienced and inexperienced users.

RQ3: Do knowledge and use of receptive and productive aspects develop simultaneously while people get more experienced with the Internet?

5. Data Collection and Research Design

The goal of this research project is to analyze second-level digital divides in a setting where the first-level digital divide has mostly disappeared. Hence, it was decided to examine the Internet use of university students with a strong affinity to the Internet and other mass media. In addition, this setting enhances international comparability since a very specific subgroup of Internet users is selected. In fact, data were and still are collected at German, Italian, Swedish and American universities using a comparable questionnaire. However, this article is limited to the data from a Swiss university in which all first year-students with mass communication as their major or minor were surveyed. To exclude potential effects of Internet access the questionnaire was administered in a classic paper pencil style in a mandatory course. A total of $N = 266$ students (about 90 % of

the cohort) participated in the survey. The survey focused on typical Web 2.0 applications like blogs, Wikipedia and Youtube.

6. Results

First, it is of interest whether the assumed closing of the first-level digital divide can be confirmed in the selected setting. The students were asked whether they have Internet access at different locations and whether they use it sometimes or regularly (at least once a week). Table 4 shows that all students (100 %) use the Internet regularly at home. 92 % access the Internet at the university, 41 % at their workplace, 67 % at their friends' or family's places and 42 % at public places.

Table 4: Internet Access (First-level Digital Divide)

	Internet access available? (N = 266)			
	No	Yes, but I don't use it	Yes, I use it sometimes	Yes, I use it regularly
At home	0 %	0 %	0 %	100 %
At university/school (e.g. library, computer lab)	2 %	6 %	50 %	43 %
At work	51 %	8 %	16 %	25 %
At friends or family places	8 %	25 %	52 %	15 %
At public places (e.g. restaurants, on the go)	28 %	30 %	35 %	7 %

6.1. Individual Need (RQ1)

The first research question asks *whether there is an individual need to use the Internet as an alternative information source to classic mass media (RQ1)*. The respondents were asked to indicate their interest for various topics and the importance of the Internet as an information source compared to other mass media (newspapers, TV etc.).

Table 5 is sorted by the relevance of the topic, which was rated on a five-point scale from 1 (not important at all) to 5 (very important). Music is rated as the topic with the highest relevance (4.31) and 58 % of

Table 5: Topic Interests and Importance of Information Sources

	Relevancy	Most important information source			
		Internet	Other mass media	Equal	Don't know
Music	4.31	58 %	11 %	28 %	1 %
Movies and TV Shows	4.09	23 %	37 %	36 %	3 %
Politics / News	3.92	10 %	52 %	35 %	0 %
Art and Culture	3.54	17 %	35 %	38 %	7 %
Health, Fitness, Nutrition	3.41	22 %	20 %	43 %	13 %
Science and Research	3.32	22 %	34 %	35 %	7 %
Environment and Ecology	3.25	6 %	32 %	46 %	14 %
Gossip	3.18	16 %	36 %	32 %	14 %
Fun (Jokes, Comics, Humor)	3.04	26 %	26 %	28 %	18 %
Sport	3.02	15 %	33 %	33 %	16 %
Finance and Economics	2.64	12 %	39 %	35 %	13 %
Technology and electronic devices	2.61	42 %	17 %	24 %	16 %

the respondents indicate that the Internet is their most important source of information. For 11 % classic mass media are more important while 28 % rate the relative importance as equal. A reverse picture can be found for politics and news (the third most important topic). The majority (52%) rate classic mass media as more important than the Internet while 35 % are undecided. A closer analysis of the pattern across various topics indicates that only very few respondents have a narrow usage pattern. A narrow usage pattern is given if a person only uses one media type independent from the topic (e.g. the Internet is most important for all topics). For 10.2 % of the participants the Internet is more important for more than half of the topics and only two persons (0.8 %) indicate that the Internet is more important irrespective of the topic. Classic mass media seem to play a more dominant role. Around one-quarter (24.4 %) of the students rate classic mass media as the major information source for six or

more topics. However, a complete preference for classic mass media can only be identified for two persons (0.8 %).

The overall importance of the Internet vs. classic mass media can be tested by a weighted index summing up all topics (preferences for a media device are weighted by the topic relevance). A comparison of the means reveals a similar picture as was found in the previous section. Classic mass media seem to be of greater importance ($m_c = 2.14$; $SE_c = .058$) than the Internet ($m_i = 1.25$; $SE_i = .059$).

6.2. Receptive and Productive Internet Use (RQ2)

Focusing on typical Web 2.0 applications it is of interest to know *which proportion exists between receptive and productive Internet use and whether this differs between important Web 2.0 applications (RQ2)*.

The frequency of receptive use reveals a substantial difference between the use of Wikipedia and YouTube vs. all other applications. While 83 % of the students look up information on Wikipedia and 84 % watch videos on YouTube at least several times a month, only 53 % read something in discussion forums, 29 % read blogs and 7 % buy something on auction platforms several times a month (Table 6). The data also show the saturation of the diffusion process. Half of all respondents have never bought something on an auction platform while everyone in the sample has used Wikipedia.

Table 6: Receptive Use

	Daily	Several times a week	Several times a month	Several times a year	Less	Never
Wikipedia	5 %	31 %	47 %	15 %	2 %	0 %
Blog	3 %	8 %	18 %	29 %	26 %	16 %
YouTube	14 %	35 %	34 %	8 %	5 %	3 %
Auction (buy)	1 %	1 %	5 %	17 %	28 %	48 %
Discussion forums	6 %	18 %	29 %	18 %	20 %	9 %

N = 266

The frequency of receptive use contrasts with the productive use reported in Table 7. Discussion forums are used on a regular basis while all other applications are only used by a minority in a productive way. 81 % have never written or corrected something on Wikipedia and 72 % have never written a blog. To compare the frequency of the productive use of Web 2.0 applications to “classic” activities of productive Internet use we also asked the respondents how often they have created a website.

Table 7: Productive Use

	Never	Once	2–3 times	More often
Wikipedia	81 %	10 %	7 %	2 %
Blog	72 %	8 %	10 %	10 %
YouTube*	71 %	16 %		13 %
Auction (sell)*	63 %	22 %		14 %
Discussion forums*	36 %	30 %		34 %
Own website	65 %	26 %	5 %	4 %

*The productive use of YouTube was measured on a different scale than Wikipedia and blogs. Productive YouTube use was measured on the same scale as the receptive use (see Table 6). The answers were recoded and two categories were collapsed in the table reported: never → never; less (than several times a year) → once/2–3 times; daily, several times a week, several times a month, and several times a year → more often. N = 266

The bivariate correlation of Wikipedia, blogs, and creation of a website shows that these three activities are only moderately correlated, but to a similar degree.

Table 8: Correlation of Productive Ways of Use

	Blog	Own website
Wikipedia	.21*	.29*
Blog	–	.23*

* $p < .01$ (two-sided); N = 265

6.3. Knowledge, Use, and Experience (RQ3)

Since the respondents in the setting are especially homogeneous with respect to age and educational level it cannot be tested whether these variables have an impact on one of the four aspects of the literacy concept. Therefore, the most important independent variable is the Internet experience measured as the number of years people use the Internet on a regular basis. Table 9 reports the distribution in the given setting: 61.3% have used the Internet for 6–10 years on a regular basis (average users). A third (29.3%) are classified as new users and 9.4% have used the Internet for more than 10 years and are therefore categorized as experienced users.

Table 9: Experience of Internet Users

		Frequency	%
“New User”	less than 6 years	78	29.3
“Average User”	6–10 years	163	61.3
“Experienced User”	more than 10 years	25	9.4
<i>Total</i>		<i>266</i>	<i>100.0</i>

To enhance the comparability of the four literacy aspects, all measures were rescaled to a five-point scale and means were calculated for the knowledge items since they consist of two and three items respectively. The research question *whether knowledge and use of receptive and productive aspects develop simultaneously while people get more experienced with the Internet (RQ3)* can be divided into two sub-questions: first, it is of interest to know how the four aspects are related, and second, it is of interest to know whether the aspects differ depending on the level of experience. Empirical data is only available for a subset of the above mentioned Web 2.0 applications: blogs and Wikipedia.

Table 10 provides insight into the relationship of the four aspects. In general, it can be said that the literacy aspects have a stronger correlation with blogs than with Wikipedia. For both applications receptive and productive knowledge are correlated greater than in the case of other aspects.

Table 10: Experience of Internet Users

Blog		Knowledge	Use	
		Productive	Receptive	Productive
Knowledge	Receptive	.48*	.31*	.22*
	Productive	–	.29*	.49*
Use	Receptive	–	–	.42*

Wikipedia		Knowledge	Use	
		Productive	Receptive	Productive
Knowledge	Receptive	.28*	-.02	.00
	Productive	–	.14**	.27*
Use	Receptive	–	–	.13**

*p < .01; **p < .05 (two-sided)

Figure 1 displays the blog literacy on the four distinct aspects. An analysis of variance (one-way ANOVA) reveals that significant differences between new and experienced users exist on the two knowledge dimensions, both for receptive knowledge ($F_{df2, 265} = 3.918, p = .02, \text{Eta}^2 = .029$) and productive knowledge ($F_{df2, 262} = 5.638, p < .01, \text{Eta}^2 = .042$). However, no significant differences are found on the usage dimensions (receptive use: $F_{df2, 265} = 2.140, p = .12, \text{Eta}^2 = .016$; productive use $F_{df2, 264} = 2.702, p = .07, \text{Eta}^2 = .020$).

Figure 1: Blog Literacy

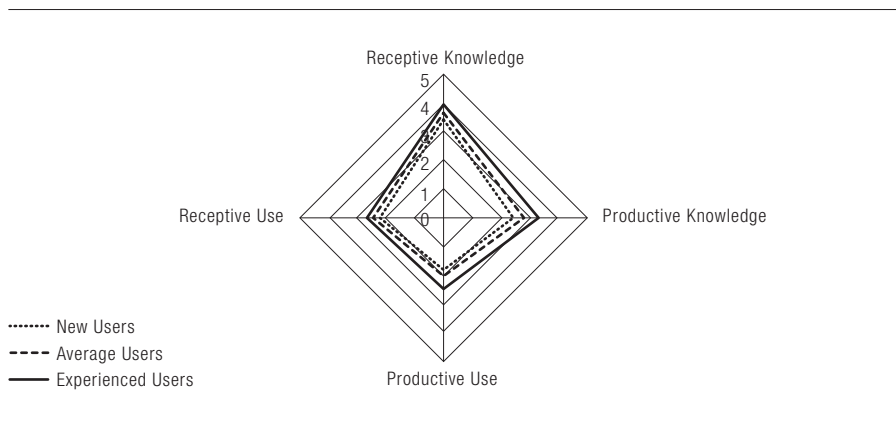
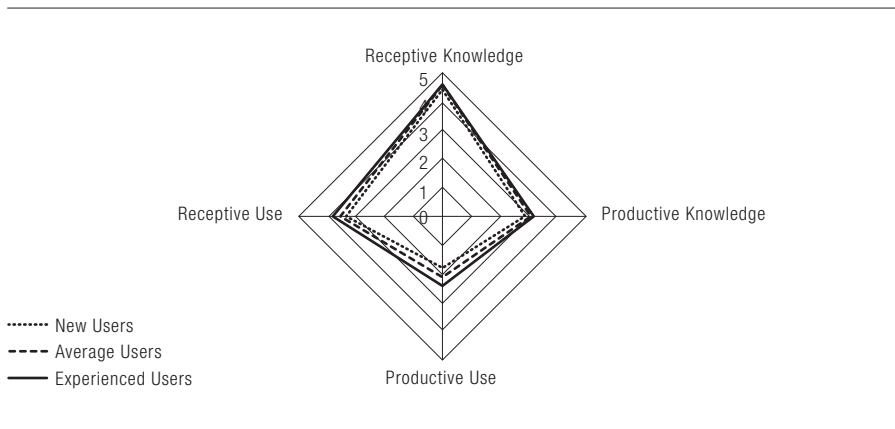


Figure 2 illustrates the literacy differences with respect to Wikipedia. Here, the analysis of variance (ANOVA) reveals a contrary pattern of Web 2.0 literacy. No significant effects are found on the knowledge level (receptive knowledge: $F_{df\ 2, 264} = .406$, $p = .667$, $\text{Eta}^2 = .003$; productive knowledge: $F_{df\ 2, 263} = 1.472$, $p = .231$, $\text{Eta}^2 = .011$) while the productive level reveals significant differences between new and experienced users regarding receptive use ($F_{df\ 2, 265} = 5.515$, $p < .01$, $\text{Eta}^2 = .040$) and productive use ($F_{df\ 2, 264} = 3.547$, $p = .03$, $\text{Eta}^2 = .026$).

Figure 2: Wikipedia Literacy



7. Discussion

The results reported above indicate that an access divide among the students does not exist anymore. One-hundred percent of the participants use the Internet at home on a regular basis. Hence, the chosen setting is an ideal case study to test for a second-level digital divide with respect to Web 2.0 literacy.

In section two it is argued that the relevance of a digital divide as well as media literacy is dependent on the individual and societal need for Internet use. This is tested for various topics which can be of interest in everyday life (*RQ1*). It is found that even though all participants have Internet access and use it on a regular basis, the Internet is not the dominant source of information. Superior importance of the Internet is only

found for the topics “music” and “technology and electronic devices.” Regarding “politics and news,” classic mass media like TV and newspapers are still the most important source for the majority – even among this young, well-educated and Internet affine subgroup of the population. Hence, it can be argued that the need for high Web 2.0 literacy to fulfill individual needs is only given for certain topics. It can be assumed that the societal need is not (yet) fully given, as the findings for “politics and news” indicate. However, the theoretical and empirical conception of the societal need requires further elaboration and the aggregation of individual need can only serve as a very rough proxy.

The results regarding the frequency of receptive and productive use of Web 2.0 applications (*RQ2*) illustrate that the overall level of activity has not increased as much as the notion of the “participatory” Web 2.0 suggests. In fact, the proportion of respondents who have never contributed anything to Wikipedia, wrote a blog or uploaded something on YouTube is higher than the proportion that have never created their own websites. Forty-nine percent of all respondents have never contributed to any of the three Web 2.0 applications (Wikipedia, YouTube and blogs).

The third research question addressed the fourfold measurement of Web 2.0 literacy. The most important predictor for productive use is productive knowledge, but receptive use also has considerable explanatory power concerning the productive use of blogs. With respect to the experience of the users, the results indicate that different patterns of the four aspects are given for blogs and Wikipedia. For blog literacy, significant differences are found on the knowledge dimension of new and experienced users while Wikipedia literacy differs on the two usage dimensions. These results indicate that knowledge gaps do not necessarily lead to usage gaps. Even though experienced users have significantly higher knowledge about blogs, they do not use them more intensely. The other causal interpretation seems to be unlikely as well: usage gaps do not necessarily lead to knowledge gaps. This is the case for Wikipedia. While there are significant differences between experienced and new users with respect to passive and active usage, no significant knowledge differences are found.

The rather weak relation between knowledge and use (especially for Wikipedia) allows different interpretations:

a) A first interpretation is that the low correlation demonstrates that the proposed concept covers distinct aspects of Web 2.0 literacy. Hence, the theoretical conception and empirical measurement of Web 2.0 literacy should not be limited to self-perceived skill, familiarity with Internet related terms, or frequency of use.

b) A second interpretation is that the individual and societal need for blogs and Wikipedia use is still too low to motivate individuals to maximize their usage based on their knowledge. There are still plenty of other sources to retrieve information on the various topics of interest. Hence, it could be argued that the observed second-level digital divides are of minor importance since they do not lead to disadvantages for the less experienced users.

8. Conclusions

This contribution discusses the current developments of Web applications (Web 2.0) from a perspective of digital divide and media literacy. It has been shown that Web 2.0 literacy is not a one-dimensional construct. Hence, it is proposed to distinguish four different aspects of Web 2.0 literacy, which are given by the two dimensions of skills (knowledge vs. use) and communication styles (productive vs. receptive). The empirical findings support the proposed operationalization. Most interestingly, the results for the two Web 2.0 applications under study (blogs and Wikipedia) diverged. This finding suggests that there is not a clear causal relationship between knowledge and the use of blogs and Wikipedia. It is hypothesized that this might be the case because the individual or societal need is yet too low.

The experience of Internet users (which was measured as the number of years of regular use) proved to account for significant differences of their knowledge and use of Web 2.0 applications. This means that the first-level digital divide (which is now closing) has a long-term impact as it is replicated on the second-level of Web 2.0 literacy. Hence, any actions to close the first-level digital divide are of utmost relevance for modern societies.

References

- AUFENANGER, S. (2003). Medienkompetenz und Medienbildung. *ajs-Informationen* 1: 4-8.
- BAACKE, D. (1997). Medienpädagogik. Tübingen: Niemeyer.
- BAKER, P.M. (2001). Policy Bridges for the Digital Divide: Assessing the Landscape and Gauging the Dimension. *First Monday* 12 (last retrieved on 12.5.2010, from http://firstmonday.org/issues/issue6_5/baker/index.html).
- BBC (2009). Encouraging Home Broadband Adoption Research Report. A Report for the BBC prepared by Essential Research and Ipsos MORI (last retrieved on 30.6.2010, from <http://www.ipsos-mori.com/researchpublications/publications/publication.aspx?oItemId=1309>).
- BLÖMEKE, S. (2002). Medienpädagogische Kompetenz. München: KoPäd.
- BLUMLER, J.G. & KATZ, E. (eds.) (1974). The Uses of Mass Communications. Current Perspectives on Gratifications Research. Beverly Hills/London: Sage.
- CHO, J. & GIL DE ZUNIGA, H. (2003). Beyond Access. The Digital Divide and Internet Uses and Gratifications. *IT & Society* 4: 46–72.
- DEPARTMENT FOR CULTURE, MEDIA AND SPORT AND DEPARTMENT FOR BUSINESS, INNOVATION AND SKILLS (2009). Digital Britain. Final Report. Presented to Parliament by the Secretary of State for Culture, Media and Sport and the Minister for Communications, Technology and Broadcasting. By Command of Her Majesty (last retrieved on 22.5.2010, from <http://www.culture.gov.uk/images/publications/digitalbritain-finalreport-jun09.pdf>).
- DEWE, B. & SANDER, U. (1996). Medienkompetenz und Erwachsenenbildung. In: A. VON REIN (ed.). Theorie und Praxis der Erwachsenenbildung. Bad Heilbrunn: Klinkhardt.
- DUNCAN, B. (2005). Media Literacy: Essential Survival Skills for the New Millenium (last retrieved on 12.4.2008, from <http://www.cla.ca/casl/slic/SLICVol25issue4.pdf#page=31>).
- EASTIN, M.A. & LAROSE, R.L. (2000). Internet Self-Efficacy and the Psychology of the Digital Divide. *Journal of Computer-Mediated Communication* (last retrieved on 24.4.2010, from <http://jcmc.indiana.edu/vol6/issue1/eastin.html>).
- FAIRLIES, R.W. & LONDON, R.A. (2006). Crossing the Divide. Immigrant Youth and Digital Disparity in California. Report of the CJTC – Center for Justice, Tolerance & Community. University of California (last retrieved on 31.8.2010, from <http://cjtc.ucsc.edu/docs/digital.pdf>).
- FSO – FEDERAL STATISTICAL OFFICE (2010a). Informationsgesellschaft – Indikatoren, Haushalte und Bevölkerung – Internetzugang der Haushalte (last retrieved on 28.8.2010, from http://www.bfs.admin.ch/bfs/portal/de/index/themen/16/04/key/approche_globale.indicator.30109.301.html?open=5#5).
- FSO – FEDERAL STATISTICAL OFFICE (2010b). Informationsgesellschaft – Indikatoren Haushalte und Bevölkerung – Internetnutzung (last retrieved on 28.8.2010, from

- <http://www.bfs.admin.ch/bfs/portal/de/index/themen/16/03/key/ind16.indicator.30106.160204.html?open=311,5#5>).
- GAPSKI, H. (2001). Medienkompetenz. Eine Bestandsaufnahme und Vorüberlegungen zu einem systemtheoretischen Rahmenkonzept. Wiesbaden: VS.
- GLOTZ, P. (2001). Medienkompetenz als Schlüsselqualifikation. In: I. HAMM (ed.). Medienkompetenz. Wirtschaft, Wissen, Wandel. Gütersloh: Bertelsmann Stiftung.
- GROEBEL, J. (2001). Neue Medien, neues Lernen. In: I. HAMM (ed.). Medienkompetenz. Wirtschaft Wissen Wandel. Gütersloh: Bertelsmann Stiftung.
- GROEBEN, N. (2002). Dimensionen der Medienkompetenz: Deskriptive und normative Aspekte. In: N. GROEBEN & B. HURRELMANN (eds.). Medienkompetenz. Voraussetzung, Dimensionen, Funktionen. Weinheim/München: Juventa.
- HARGITTAI, E. (2002). Second-Level Digital Divide: Differences in People's Online Skills. *First Monday* (last retrieved on 31.3.2008, from http://firstmonday.org/issues/issue7_4/Hargittai/).
- HARGITTAI, E. (2008): An Update on Survey Measures of Web-Oriented Digital Literacy. *Social Science Computer Review* 1: 130–137.
- HILLEBRAND, A. & LANGE, B.P. (1996). Medienkompetenz als gesellschaftliche Aufgabe der Zukunft. Die neuen Herausforderungen der Informationsgesellschaft. In: A. VON REIN (ed.). Theorie und Praxis der Erwachsenenbildung. Medienkompetenz als Schlüsselbegriff. Bad Heilbrunn: Klinkhardt.
- INTERNET WORLD STATS (2010). Usage and Population Statistics. (last retrieved on 29.8.2010, from: <http://www.Internetworldstats.com/stats.html>).
- JARREN, O. & WASSMER, CH. (2009). Medienkompetenz – Begriffsanalyse und Modell. Ein Diskussionsbeitrag zum Stand der Medienkompetenzforschung. *medien & erziehung* 3: 46–51.
- KAMMERL, R. (2006). Funktionalität und Dysfunktionalität des Chattens für Beziehungen von 14- bis 16-jährige Jugendlichen. *MedienPädagogik* 1: 1–22.
- KATZ, E. & LIEBES, T. (1985). Mutual Aid in the Decoding of Dallas: Preliminary Notes from a Cross-Cultural Study. In: PH. DRUMMOND & R. PATERSON (eds.). Television in Transition. Papers from the First International Television Studies Conference. London.
- KIRSCH, I.S. (1995). Literacy Performance on Three Scales: Definition and Results. In: OECD (ed.). Literacy, Economy and Society: Results of the First International Adult Literacysurvey. Paris: OECD.
- KUBICEK, H. (1999). Was ist Medienkompetenz? Fünf Statements. In: F. SCHELL & E. STOLZENBURG (eds.). Medienkompetenz. Grundlagen und pädagogisches Handeln. München: KoPäd.
- KÜBLER, H.D. (1999). Medienkompetenz – Dimensionen eines Schlagwortes. In: F. SCHELL & E. STOLZENBURG (eds.). Medienkompetenz. Grundlagen und pädagogisches Handeln. München: KoPäd.
- LANGE, B.P. (1999). Was ist Medienkompetenz. Fünf Statements. In: F. SCHELL & E. STOLZENBURG (eds.). Medienkompetenz. Grundlagen und pädagogisches Handeln. München: KoPäd.

- LIVINGSTONE, S. (2003): The Changing Nature and Uses of Media Literacy. *Media@lse* (last retrieved on 11.3.2010 from: http://www.lse.ac.uk/collections/media@lse/pdf/Media@lseEWP4_july03.pdf).
- MERTEN, K. (1977). *Kommunikation. Eine Begriffs- und Prozessanalyse*. Opladen: Westdeutscher.
- MIKOS, L. (2007). Mediensozialisation als Irrweg – Zur Integration von medialer und sozialer Kommunikation aus der Sozialisationsperspektive. In: D. HOFFMANN & L. MIKOS (eds.), *Mediensozialisationstheorien. Neue Modelle und Ansätze in der Diskussion*. Wiesbaden: VS.
- MOSER, H. (1999). *Einführung in die Medienpädagogik. Aufwachsen im Medienzeitalter*. Opladen: VS.
- NORRIS, P. (2003). *Digital Divide. Civic Engagement, Information Poverty, and the Internet Worldwide*. Cambridge: Cambridge University Press.
- OFCOM – OFFICE OF COMMUNICATION (2008). *Media Literacy Audit. Report on UK Adults' Media Literacy* (last retrieved on 14.2.2010, from http://www.ofcom.org.uk/advice/media_literacy/medlitpub/medlitpubrss/ml_adult08/ml_adults08.pdf).
- PALMGREEN, P. & RAYBURN, J.D. (1979). Uses and Gratifications and Exposure to Public Television. *Communication Research* 2: 155–134.
- PÖTTINGER, I. (1997). *Lernziel Medienkompetenz. Theoretische Grundlagen und praktische Evaluation anhand eines Hörspielprojekts*. München: KoPäd.
- RICE, R.E. & HAYTHORNTHWAITHE, C.A. (2006). Perspectives on Internet Use. In: L.A. LIEVROUW & S. LIVINGSTONE (eds.). *Handbook of New Media: Social Shaping and Social Consequences*. London: Sage.
- SCHELL, F. (1998). Medienkompetenz “in eigener Regie”. *Television* 11: 25–28.
- SCHORB, B. (1998). Stichwort Medienpädagogik. *Zeitschrift für Erziehungswissenschaften* 1: 7–22.
- SCHULZ-ZANDER, R. (1997). Lernen in der Informationsgesellschaft. *Pädagogik* 49: 8-12.
- SPANHEL, D. (1999). Der Aufbau grundlegender Medienkompetenzen im frühen Kindesalter. In: I. GOGLIN & D. LENZEN (eds.). *Medien-Generationen. Beiträge zum 16. Kongress der Deutschen Gesellschaft für Erziehungswissenschaften*. Opladen: Leske & Budrich.
- STOLZENBURG, E. & BAHL, A. (1999). Medienkompetenz bei 11- bis 15-jährigen Mädchen und Jungen: Grundlagen und Voraussetzungen. In: F. SCHELL & E. STOLZENBURG (eds.). *Medienkompetenz. Grundlagen und pädagogisches Handeln*. München: KoPäd.
- SUTTER, T. & CHARLTON, M. (2002). Medienkompetenz – einige Anmerkungen zum Kompetenzbegriff. In: N. GROEBEN & B. HURRELMANN (eds.). *Medienkompetenz. Voraussetzung, Dimensionen, Funktionen*. Weinheim/München: Juventa.
- THEUNERT, H. et al. (1995). *Wir gucken besser fern als Ihr! Fernsehen für Kinder*. München: KoPäd.
- THEUNERT, H. (1999). Medienkompetenz: Eine pädagogische und altersspezifisch zu fassende Handlungsdimension. In: F. SCHELL & E. STOLZENBURG (eds.). *Medienkompetenz. Grundlagen und pädagogisches Handeln*. München: KoPäd.

- THIELE, G.A. (1999). Produktive Medienarbeit in der Schule – heute. In: D. BAACKE & S. KORNBLUM et al. (eds.). *Handbuch Medien: Medienkompetenz, Modelle und Projekte*. Bonn: Bundeszentrale für politische Bildung, Referat Medienpädagogik und Neue Medien.
- TREUMANN, K.P. et al. (2002): *Medienkompetenz im digitalen Zeitalter. Wie die neuen Medien das Leben und Lernen Erwachsener verändern*. Opladen: Leske & Budrich.
- TREUMANN, K.P. et al. (2007): *Medienhandeln Jugendlicher. Eine empirische Studie zu Mediennutzung und Medienkompetenz von Heranwachsenden*. Wiesbaden: VS.
- TULODZIECKI, G. (1998). Entwicklung von Medienkompetenz als Erziehungs- und Bildungsaufgabe. *Pädagogische Rundschau* 52: 693–709.
- VOLLBRECHT, R. (1999). Medienkompetenz als kommunikative Kompetenz. Rückbesinnung auf Neufassung des Konzepts. *medien & erziehung* 1: 13–18.
- WARSCHAUER, M. (2002). Reconceptualizing the Digital Divide. *First Monday* (last retrieved on 31.8.2010 from: <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/967/888>).
- ZILLIEN, N. (2009). *Digitale Ungleichheit. Neue Technologien und alte Ungleichheiten in der Informations- und Wissensgesellschaft*. 2. Aufl. Wiesbaden: VS.

Submitted: 8 September 2010. Resubmitted: 7 December 2010. Accepted: 13 December 2010. Refereed anonymously.