Media Use for Learning by Students in Higher Education
An International Empirical Survey

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Media, media use, higher education, tertiary education, information media, e-book, e-journal, learning media, e-learning, web 2.0, information systems, information science

Abstract

The web 2.0 has already penetrated the learning environment of students ubiquitously. The dissemination of online information services into tertiary education has led to constant changes in students' learning and study behaviour. Students use services such as Google and Wikipedia most often not only during free time but also for learning. At the same time, traditional information media such as textbooks or printed hand-outs still form basic pillars in their learning environment. To measure the media usage for learning and how it changes an international long term media survey in tertiary education was set up by the author and other cooperation partners. Beginning with a first survey carried out at Karlsruhe Institute of Technology in 2009, currently a total of 13 surveys at 11 institutions of higher education in several countries were carried out. Until October 2011 about 10,000 students were asked 143 questions about their information media use for learning and close-by topics.
The survey measures and compares the usage frequency and satisfaction of 48 services, among them information media services such as Google, Google Books, library catalogues, printed books, e-books, printed journals, e-journals, Wikipedia, open educational resources, bibliographic software and more. Beyond, also other variables are evaluated, such as the learning behaviour, media usage during free time, usage of IT hardware, education biography and sociodemographic factors.

Introduction

The rapid and ubiquitous diffusion of digital media into Higher Education leads to constant changes of the students' learning environment and also influences their learning behavior. This urges universities to understand and analyze the media usage behavior of the students comprehensively. Media usage for learning not only includes e-learning but also the use of text-based and other media, electronic as well as print. It not only implies media provided by teachers but also media which are used by the students for self-controlled and informal learning.

The globalization of education leads to an international market in higher education which follows the rules of competition. Education is "sold" on the market. Students in tertiary education are becoming more and more mobile and choose their education like a product. At the same time universities are opening themselves more and more up to external learners. This means new challenges but also new chances for institutions of tertiary education. Media and play a key role in this process of globalization in education as they give educational institutions a chance to reach students around the globe. Furthermore, media allow mobility for students and teachers and assist in linking individuals on an international level, for example by using social networks. If institutions of

higher education understand the media usage patterns of their students, they can reach them in the most effective way by creating customized offers to recruit new students and to create an attractive media learning environment. This survey is a contribution to where these potentials are to be found.

Students generally tend to be early adopters of media and information technology, as they possess above-average media access and skills. Besides, they are also not only passive users, but designers and developers of technology. An example is Facebook: Created in 2004 by Harvard University students, it has become one of the most successful Internet services worldwide and – during the last two years.

Students in tertiary education strongly use external web 2.0 services, such as Google, Wikipedia, and Facebook, during their free time as well as for their studies (Smith et al., 2009). Current development of web 2.0 is often characterized by the increase in direct interactions between users (O'Reilly, 2005). Mobile broadband Internet access and the use of corresponding equipment, such as netbooks or smartphones, have fueled the boom of the social web by students in Higher Education. Although there have been speculations concerning the potentials of this technological shift for student learning (Johnson et al., 2008, 2009, 2010), the real benefits of these technologies for the learning outcome are not yet clear.

The acceptance of e-learning by students has increased in recent years, but not all services are accepted equally. Students generally refrain from technologies that require much effort and prefer a modest instead of an intense use of e-learning (Kvavik & Caruso 2005, p. 93; Sharpe et al., 2009). It has also become clear that simply using media and e-learning does not improve the learning process as it was shown by the meta analysis of Russell (2001). He compared about 350 research projects and found out that the use of e-learning doesn't make a significant difference for the learning outcome.

A key success factor of e-learning is the quality of the services (Ehlers, 2004a, 2004b). This quality is not to be (mis)understood as "product quality" but as the quality from the subjective point of view of the student. This goes along with the current theory, that bases learning in Higher Education on moderate constructivism and assumes that the learning quality and learning success - with or without the use of media – are both generated by the learning individual and the learning environment. This perspective marks an essential difference to most of the research carried out in the e-learning sector, where mostly the product quality stands in the focus. Taking this position, research about media use in Higher Education has to be carried out by measuring quality of services from the student's perspective.

The research about the critical success factors of e-learning basically focuses on formal and university-internal e-learning services such as learning platforms (Papp, 2000; Selim, 2007; Soong et al. 2001; Volery & Lord, 2000). But students do not only use internal but also external media services, and therefore both areas have to be considered to obtain a complete impression. Hence, also the variety of informal learning processes which include the use of media seems to be relevant. This perspective on the whole spectrum of media used for learning (print, e-learning, and web 2.0) requires a certain theory-oriented empirical research approach, which is based on these positions to get a deeper understanding about the media usage behavior of students in Higher Education.

The precedent literature review of the research project included a total of 60 statistics and studies. Among them were 25 studies and statistics on media use in general, ten studies and statistics on media use by children, adolescents, and post-adolescents, and 20 studies and statistics dealing explicitly with students, universities, and the use of media in the context of tertiary education. Several international research projects on media use by students were considered, such as the long-

term ECAR study from the United States (Kvavik & Caruso, 2005; Kvavik, Caruso & Morgan 2004). Another important survey is the British Google Generation Project (British Library & JISC, 2008; JISC, 2008). Regarding future prognosis, the US long-term study "Horizon Project" (Johnson, 2004; Johnson & Smith, 2005, 2006; Johnson, Levine & Smith, 2007, 2008, 2009; Johnson, Levine, Smith & Stone, 2010; Johnson, Smith, Willis, Levine & Haywood, 2011) is one of the most comprehensive sources about which technologies will be established in higher education in the future. Accordingly, future trends in the next years will include grassroots video, collaboration webs, mobile broadband, collective intelligence and social operating systems.

Objectives

Based on the described state of knowledge, this survey follows an approach, where students and their usage behavior are in the focus. They are considered as active individuals who use media by own decisions and motivations. This use of media for learning and studying has to be seen in its entire bandwidth, complexity, and diversity. An adequate and applicable theory model has to be chosen, which also outlasts the dynamic changes in the media environment over the next years.

Having this in mind, a survey instrument was developed, especially focussing the following objectives:
* A detailed description of media usage, including media usage frequency, satisfaction and acceptance of university internal and external services: print media, electronic text, social media, information and communication media, e-learning-services and IT hardware
* Possible influence factors on the media usage for learning
* Creating a knowledge base for university administrators and teachers to understand the media usage of students
* Establishing an international survey of media use in Tertiary Education

Methods

The survey uses a model which was developed and modified during the pilot survey at KIT 2009 conducted by the author (Grosch, 2011, 2012). It is influenced by the Ecological Model of Bronfenbrenner (1979, 1998), its modification for media-related research by Johnsson-Smaragdi (1994) and the Information Systems Success Model by DeLone & McLean (1992).

In the sense of this survey, media are understood as **technologies supporting and extending human communication**. Information is regarded as a unidirectional form of communication. Hence, information services are also understood as media services. In the field of digital media, where the content is not fixed on a physical data carrier, this definition of media includes software media services as well as hardware media. Though software media can be transferred to different hardware, the latter is necessary to access software media. Media acceptance is considered to be a special form of technology acceptance and is seen as an indicator of the quality of media use from students' subjective point of view. Hence, media quality can be evaluated by measuring the acceptance of the media services which are used by the students. Beginning with a first survey carried out at Karlsruhe Institute of Technology in 2009, currently (January 2012) a total of 15 surveys at 11 institutions of higher education in several countries are being carried out. The following table shows an overview over all surveys:

Institution	Time	Size
1 Karlsruhe Institute of Technology (KIT)	07/2009	1.479

2	KIT II	06/2011	1.485
3	KIT teachers	07/2011	173
4	Mahidol University International College (MUIC)	02/2011	542
5	University of the Thai Chamber of Commerce (UTCC)	08/2011	499
6	Technical University of Braunschweig	07/2011	686
7	King Mongkut University of Technology Thonburi (KMUTT)	09/2011	897
8	University of Barcelona (UB)	01/2012	1.000*
9	UB teachers	01/2012	400*
10	UB administrators	01/2012	200*
11	Rangsit University	02/2012	500*
12	Kasetsart University	02/2012	500*
13	Bangkok University	02/2012	500*
14	Khonkaen University	02/2012	1.000*
15	Mahidol University	02/2012	1.000*

Table 1: overview of all surveys (*: aimed)

After carrying out the pilot survey at KIT in 2009, a second survey was conducted at Mahidol University International College (MUIC) in Bangkok, Thailand. The country was chosen because of its high cultural distance to Germany and its good general and IT infrastructure. MUIC was selected from three possible universities because of its high reputation and the good IT access of the students. The other cooperating universities were found by using existing cooperation relationships. IT is aimed to step by step spread out the survey to more and more countries. When having finished the already started surveys in April 2012, about 10,000 samples will be collected.

The survey contains a total of 143 questions. It measures the usage frequency and satisfaction of 48 media services, among them information services (Google, Google Books, library catalogues, printed books, e-books, printed journals, e-journals, Wikipedia, open educational resources bibliographic software) communication services (internal and external e-mail, Twitter, Facebook) e-learning-services (learning platforms, wikis) and media hardware (wi-fi, notebook, tablet computer, desktop computer, smartphone). Beyond, also other variables are evaluated, such as the learning behaviour, media usage during free time, education biography and sociodemographic factors. The survey was mostly carried out in print version, but is also available online.

Results

The surveys at the different universities led to several acceptance rankings of media. They have all in common, that Google web search is the most accepted media service. Regarding internal services, especially class attendant media like scripts and slides of the teacher and textbooks are highly accepted, along with university information services such as library catalogues. Electronic texts, such as e-books or electronic journals also have already penetrated the learning environment of the surveyed students on a high level. Some external web 2.0-services, like Facebook or Wikipedia, are also highly accepted at all surveyed universities. At the same time services like Twitter and other web 2.0-services that are discussed intensely regarding their potential for higher education are accepted only on a low level. The same goes for most of the e-learning-services such as learning platforms or wikis with active participation. Regarding some e-learning-services it is striking, that there is a significant gap between usage frequency and satisfaction.
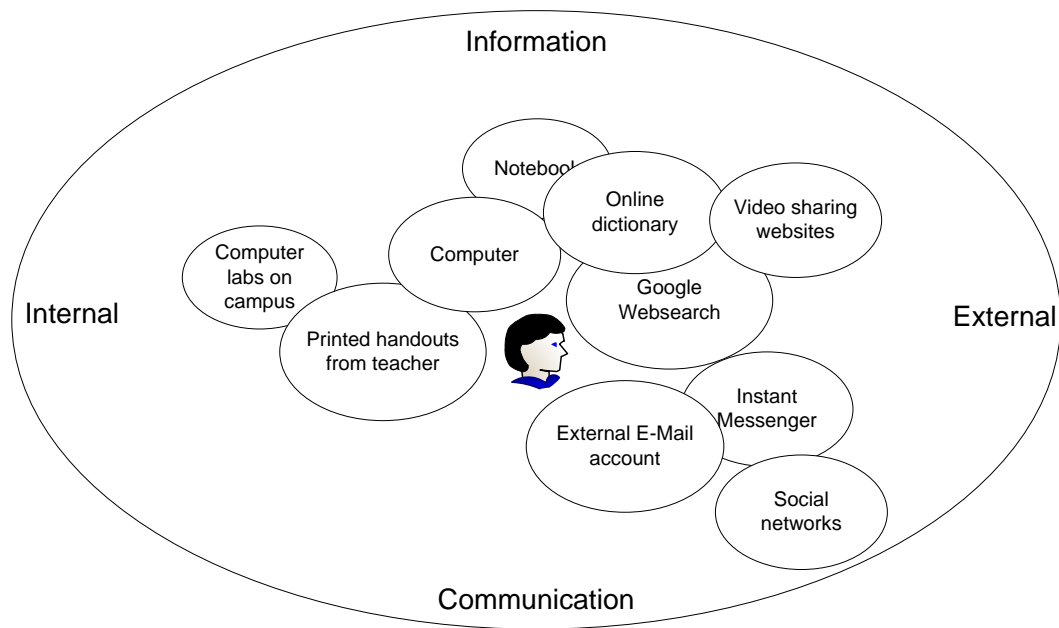
Figure 1: the top-ten accepted media services of MUIC students

As possible influence factors on the media use for learning, several dimensions of learning behaviour, sociodemographic factors, the educational biography and the access to media can be considered as they show significant regression relationships with the acceptance of media for learning. It also could be proved, that students who use media intensely but focussed on text and information are the ones that are especially successful during their study. At the same time, students who are generally averted and students who use media intensely but not very focussed are less successful. Hence, the usage of text media, printed as well as electronic, can be regarded as an indicator of study success: students who use text media intensely are more successful.

Of special interest are certain changes in the possession of media devices which are going on during the last years. Here a clear change from stationary computing (desktop computer and stationary internet connection) to mobile computing (notebook, tablet computer, smartphone, mobile wi-fi) could be measured in all surveys. A new phenomena is the rapid dissemination of tablet computers into the learning environment of the students. The latest survey, carried out at King Mongkut University of Technology Thonburi, Thailand, showed that already 20 per cent of the students own a tablet computer, while this device is only on the market since May 2010 (the release date of the iPad). Mobile internet flatrates and smartphones are also spreading fast among the students. At the same time the desktop computer seems to disappear slowly but constantly.

At the KIT 2011 survey also the media usage of the teachers was in the focus. It showed that there could be a significant gap in the media use of the teachers and the students, as teachers use way less social media for their work as the students and on the other hand stronger tend to traditional print media.

Discussion

When it comes to education, new media are often discussed in a negative way. The survey could show that also digital media are more and more becoming necessary tools for learning at campus universities and they have, if they are used in an appropriate way, an overall positive effect on the learning outcome. Trends of special interest during the next years are mobile computing and electronic text. Though, at campus universities the several e-learning-services are only accepted

below average, it is expected that there will be a different situation when it comes to distance learning. Here it could be of special interest, why there is a gap between usage frequency and satisfaction, as closing of this gap could lead to a better learning environment of the students. In addition to the already running surveys, several other universities in Canada, Germany, Malaysia and Vietnam have claimed interest. The next steps also include establishing an online survey in the six languages of the United Nations, which can be used by any university of any country. One focus of interest will be surveying open universities and universities of distance learning. In a further step it is aimed to spread out the survey more systematically and cover more countries and different institutions of Higher Education. Universities who are interested in carrying out the survey are invited to contact the author.

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