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Which Media Services Do Students Use In Fact? Results Of An International Empirical Survey

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Abstract

The dissemination of online information services into higher education has led to constant changes in students' learning behaviour. Nowadays they use services like Google and Wikipedia most often not only during free time but also for studying. At the same time, traditional information media such as the textbook or the printed hand-out from the teacher still form basic pillars in their learning environment. To measure the whole variety of media, that are used for learning, an international long term Media Survey in Higher Education ("MESHED") was set up by the authors. It aims to get detailed knowledge about how students use media for study from an international and a long term perspective. This knowledge shall be used to develop recommendations for university media strategy, make prognoses for future media trends in higher education and to figure out influences of external dimensions on the media usage. Beginning with a first survey carried out at Karlsruhe Institute of Technology, Germany in 2009, currently (October 2013) a total of 30 surveys in ten countries were, or currently are carried out. The survey uses a fully standardized questionnaire that measures the acceptance of 48 media services, such as Google search, library catalogues, printed books, e-books, printed journals, e-journals, e-learning-services, virtual class, Wikipedia, open educational resources, bibliographic software and more. It also measures adjacent areas, such as the learning behaviour, study success, media usage during free time, usage of IT hardware, education biography and sociodemographic factors. This paper focusses on the results of a survey that was conducted at the University of Barcelona (UB) between March and June 2012. There, about 1,000 samples were collected. The data showed an intense use of a broad variety of media among UB students. Though, not all media services were accepted equally: while especially some university external services, such as Google web search or Wikipedia were used by almost every student, other media, e.g. virtual learning services were used on a very low level. An exploration of hidden structures of media usage behaviour, using factor and cluster analysis revealed that especially text and text related media (books, eBooks, library catalogues) seem to have a positive effect on the learning success. A comparison of the Barcelona sample with the data of other countries showed some communalities, e.g. a high usage of Google and other external services. But there were also hints to cultural differences, such as an explicit maverick or non-social learning behaviour of Spanish students. This general tendency also appears in the media sector where they tend to

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use information media and, compared to students from other countries, use less social media. An additional survey in Canada/Ontario has been conducted in January-February 2013, and at the moment the third survey at the KIT is running. Especially some of the results from Canada show specific aspects, that might be interesting to be compared to the Spanish and German findings.

Keywords: Media usage, Higher Education, web 2.0, e-learning, mobile learning

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 behaviour. This urges universities to understand and analyse the media usage behaviour 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 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 are able to reach them effectively, e.g. by creating customized offers to recruit new students or by providing a user-oriented attractive media environment. This survey aims to find out 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. It is also known that students in higher 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, Salaway, & Caruso, 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 fuelled the boom of the social web by students in Higher Education. Although there has been a lot of speculation about the potentials of this technological shift for student learning (Johnson, Levine, & Smith, 2008; Johnson, Levine, & Smith, 2009; Johnson, Levine, Smith, & Stone, 2010) the real benefits of these technologies for the actual learning process and success remain unclear.

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; Sharpe, R., Beetham, H., Benfield, DeCicco, & Lessner, 2009. It has also become clear that using media and e-learning does not automatically improve the learning result. The meta analysis of Russell (2001) compared about 350 research projects and found out that the use of e-learning doesn't make a significant difference to the learning outcome.

A key success factor for e-learning is the quality of the services (Ehlers, 2004a; Ehlers, 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 position of moderate constructivism and assumes that the learning quality and learning success – with or without the use of media – are generated by the learning individual as well as the learning environment. This position marks a difference to other research about media in higher education, where the product quality stands in the focus. Hence, quality of media usage for learning has to be measured from the student's perspective.

Most of the research about the critical success factors of e-learning focuses on formal and university-internal e-

learning services such as learning platforms (Papp, 2000; Selim, 2007; Soong, Chan, Chua, & Loh, 2001; Volery & Lord, 2000). But students don't use only internal but also external media services. Therefore both areas need to be surveyed to get the whole picture. Also the variety of media enriched informal learning processes are 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 behaviour of students in Higher Education.

The precedent literature review of the research project included a total of 60 studies. Among them were 25 studies on media use in general, ten studies 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 higher 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, Levine, & Smith, 2008; Johnson, Levine, & Smith, 2009; Johnson, Levine, Smith, & Stone, 2010; Johnson, 2004; Johnson, & Smith, 2005; Johnson & Smith, 2006; Johnson, Levine, & Smith, 2007; Johnson, Smith, Willis, Levine, & Haywood, 2011) is one of the most cited 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. Though the Horizon Report had a strong impact on the scientific community, a closer look at it results reveals that its reliability has to be questioned. A significant share of the prognosis that were made in the Horizon Reports didn't become true. This leads to the conclusion that additional research with alternative methodology is needed to reliably predict the media usage of students in the future.

1 Objectives

Starting from a comprehensive empirical survey of students' media usage behaviour for learning over a period of time it will be tried to identify on-going media trends and, proceeding from that, to make predictions about future trends of media in higher education. Based on the theoretical position described above, students are considered to be active and self-controlled individuals who use media by own decisions and motivations, but who are also influenced by external factors, e.g. the existing media and learning environment. Furthermore, the use of media for learning and studying has to be surveyed 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 several years. In addition to these general objective, this paper especially focusses on one survey that is part of the project, carried out among students of the University of Barcelona (UB) (as well as at the University of Western Ontario in London/Canada ("Western"), and the Karlsruhe Institute of Technology, Germany ("KIT")), with a focus on the following objectives:

1. Computer and media device possession of UB students ("e-readiness")
2. A detailed evaluation of media acceptance, including media usage frequency and satisfaction of university internal and external services: print media, electronic text, social media, information and communication media, e-learning-services and IT hardware
3. Differences regarding 1. and 2. of the UB samples to samples from other surveyed countries.
4. A first explorative view on possible influence factors on the media usage for learning of UB students

Based on these results, predictions about future media trends are made and recommendations for media strategies at universities are given in the discussion part (5.). In addition, further interpretations and conclusion were made.

2 Methods

Based on the theoretical position stated in the introduction and the described objectives, the methodology of the research follows an approach, where students and their actual usage behaviour are in the focus. The survey uses a

model that was developed and modified during the pilot survey at KIT 2009 conducted by two of the authors (Grosch, 2011; Grosch, 2012). It is influenced by the Ecological Model of Bronfenbrenner (1979) and Bronfenbrenner and Morris (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 model, media are understood as technologies supporting and extending human communication. The process of gathering and absorbing Information by using media is regarded as a (unidirectional) form of communication. Hence, information services are also understood as media services. A central concept of the theoretical framework is "media acceptance". It is considered to be a special form of technology acceptance and 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 that are used by the students. To empirically operationalize the frame model, the dependent dimension "media acceptance" was operationalized into 1. usage satisfaction and 2. usage frequency which were later on merged into a media acceptance variable by computing a mean value ($(Value_{usage\ frequency} + Value_{usage\ satisfaction})/2$).
The survey questionnaire contains a total of 140 items. It measures the usage frequency and satisfaction of 50 media and IT 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) and e-learning-services (wikis, faculty e-learning services). In addition, 60 variables were operationalized to measure the independent dimensions (educational biography, learning behaviour, sociodemographic properties, leisure use of media, media skills).

3.	Which of the following do you use for study?	Very often				Never	Don't know
3.1	Mobile phone (smartphone, iPhone)	O	O	O	O	O	O
3.2	Mobile Internet connection (with notebook, tablet or mobile phone)	O	O	O	O	O	O
3.3	Notebook computer / Netbook	O	O	O	O	O	O
3.4	Desktop PC	O	O	O	O	O	O
3.5	Internet connection at home	O	O	O	O	O	O
3.6	Tablet computer (iPad, Galaxy Tab, Zoom)	O	O	O	O	O	O
3.7	E-book reader (Kindle, Nook, Sony Reader)	O	O	O	O	O	O
3.8	E-learning as part of the class	O	O	O	O	O	O
3.9	Newsgroups, Internet forums	O	O	O	O	O	O
3.10	Wikis with active participation as part of the class	O	O	O	O	O	O
3.11	Online materials from other universities	O	O	O	O	O	O
3.12	Learning software	O	O	O	O	O	O
3.13	University website	O	O	O	O	O	O
3.14	Web portal for online student web services	O	O	O	O	O	O
3.15	Online dictionary	O	O	O	O	O	O
3.16	Dictionary software installed on your computer	O	O	O	O	O	O
3.17	Computer labs on campus	O	O	O	O	O	O

Figure 1: detail of the students' questionnaire, English version. For the UB survey a Spanish translation was used. Both versions can be requested from the authors.

Most of the variables used 5+1-point scales plus (very high usage - no usage + I don't know, very satisfied-very unsatisfied + I don't know, strongly agree - strongly disagree + I don't know etc.). Beginning with the first survey that was carried out at Karlsruhe Institute of Technology in 2009, a second survey was conducted at Mahidol University International College (MUIC) in Bangkok, Thailand. This survey aimed to get another sample with a high cultural distance to the first sample from Germany and to validate, generalize and internationalize the survey instrument. Proceeding from these two samples the project was spread out to more universities and more countries. Currently a total of 10 surveys were carried out in: Germany (2 universities, 3,800 samples), Thailand (six

universities, 3,200 samples), Philippines (one university, 750 samples), Spain (Barcelona) and Canada (London/Ontario. Around 15 more surveys in these and other countries are in the process of data collection. Most of the surveys were carried out with printed questionnaires, but in some cases also online. Such as in the case of the online survey at the University of Barcelona. In this survey, which is also the focus of this paper, 982 samples were collected from March to June 2012.

3 Results

3.1 Possession of media devices

Overall, UB students seem to be well-equipped with media and IT devices. They seem to possess a high level of "e-readiness" as the biggest share of them got one or more computer devices that can be used to access learning relevant online and digital media services. An average UB students possesses 4.5 of the ten media devices listed below. Overall, the rates are quite similar to the values of other surveyed countries, such as Germany (Grosch & Gidion, 2011; Gidion & Grosch, 2012; Grosch, 2012) or Thailand (Grosch, 2012; Grosch, & Philips, 2012) Especially in the area of mobile handheld devices (smartphones, music players, mobile internet, tablet computers and e-readers) the rates are very close.

Device	Rate
Internet connection at home	94.6
Notebook	78.9
MP3/MP4/MP5-Player/iPod	67.7
Desktop computer (PC, Mac)	64.6
Smartphone/iPhone/Blackberry	59.0
Mobile internet connection	35.8
E-book, e-reader, Tablet	17.8
Netbook	17.5
Electronic dictionary (TalkingDict)	13.9
IPad/Galaxy	9.3

Table 1: device possession of UB students

However, there are also several significant differences between the media device ownership of Spanish students and the surveyed students of other countries. UB students for example seem to have a higher possession rate of internet connections at home (94.6 vs. 85 - 90 per cent in other countries), a higher rate of desktop computer ownership (64.4 vs. 40 - 50 per cent in the surveyed other countries) and a lower rate of notebook ownership (78.9 vs. 80 - 90 per cent in other countries). This leads to the overall impression, that Spanish students still rely more on stationary computing than students of other countries that were part of the research project. In Germany, Thailand and the Philippines, stationary desktop computers and internet connections are already stronger replaced by mobile devices. However, this trend only seems to occur among bigger computer devices (notebook or bigger) and not among smaller mobile devices such as smartphones and tablet computers.

3.2 Media acceptance of services

The surveys led to the overall impression of an intense, diverse and self-controlled media use by UB students. Regarding the acceptance values of all surveyed media services, a comparison of the UB data to the other surveyed universities hints to an overall global media usage culture, that is overlaid by several national and local differences. To compare the acceptance of the different media services, an acceptance ranking was generated, using the mean values (see methods part). This ranking shows, that especially online information services and mobile computing devices are highly accepted among Spanish students as wells as students from other countries. All surveys show the common result, that Google web search and the usage of a university external e-mail-service are among the most accepted media services. In addition to that, UB students show a special affinity to Google as they also use not only

Google web search but also other Google services more often than students from other surveyed universities. Also the social web and its protagonists Facebook and YouTube are more and more disseminating into students' learning environment in the surveyed countries, though with different intensity. 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 in all countries. The classical textbook still forms a basic pillar of learning but is already gradually beginning to be replaced by electronic textbooks and other electronic text media.

The Canadian case: Students Usage Frequency of Media

The findings concerning students' media use for teaching and learning in the Canadian case (Gidion, Capretz, Grosch, & Meadows, 2013) show some similarities and some differences to the Spanish and the German cases. Google search is the most commonly used web service by all students for learning and study purposes, with as a moderately close second. Facebook is only in moderate use for learning and Twitter and Google+ are quite infrequently used for this purpose. To determine if there were differences between students from different faculties, students from the five 5 most largest faculties have been compared (see Figure 2).Significant differences in the use of Wikipedia were evident, with the students from health sciences reported more frequent use for learning than students from science engineering.

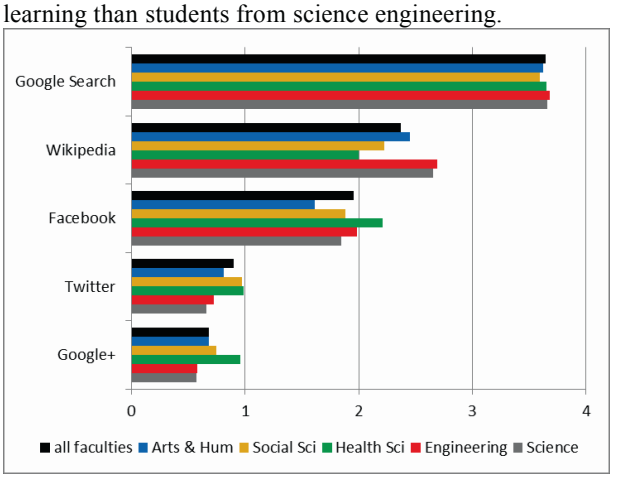

Fig. 2: The Western students have been asked how often they use various media for learning/studying (valid n = 957 – 979). The question was rated on a five-point Likert scale with the following choices: "never" (0), "rarely" (1), "sometimes" (2), "often" (3), and "very often" (4).

The Canadian Case: Media Usage in Free Time

The students at Western have been asked also about their use of diverse media in their free time. The results show a general intensive use of Facebook and video sharing websites (e.g., Youtube). Reading books and watching TV, two traditional media habits, were only used moderately. Certain media use like playing computer games are, for most students, less relevant, "very new" media such as Google+ seem not to be relevant, at least at the time of the survey.

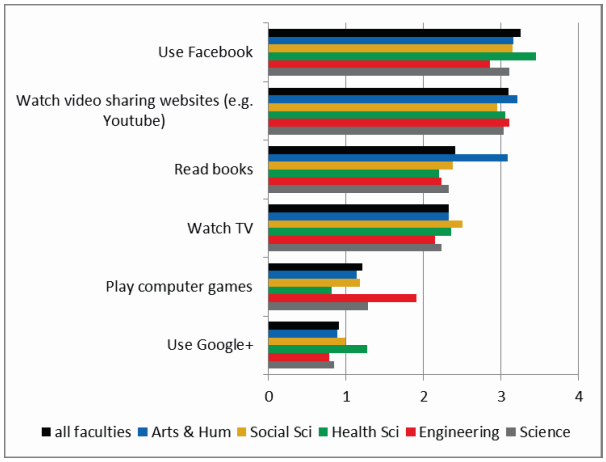

Fig. 3: The survey asked Western students from different faculties how often they performed various online activities during their free time (valid n = 973 – 980). The rating scale offered items such as "never" (0), "rarely" (1), "sometimes" (2), "often" (3), and "very often" (4).

We did find significant differences ($p < .01$) between the faculties on the items "Read books", with Arts and Humanities reporting reading more books than all other students, and the item "Play computer games", with reporting engineering students reporting a higher frequency of playing games than health science students.

Back to the Spanish case: Regarding internal services, especially class attendant media like scripts and slides of the teacher 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 students' learning environment son a high level. In general. e-learning-services such as learning platforms or wikis used in class are only used rarely and with little satisfaction, with one exception: among the UB sample the learning platform Moodle (ranked 10th place) is among the top ten accepted media services, while in the other surveys learning platforms are placed in the middle or lower third of the ranking.

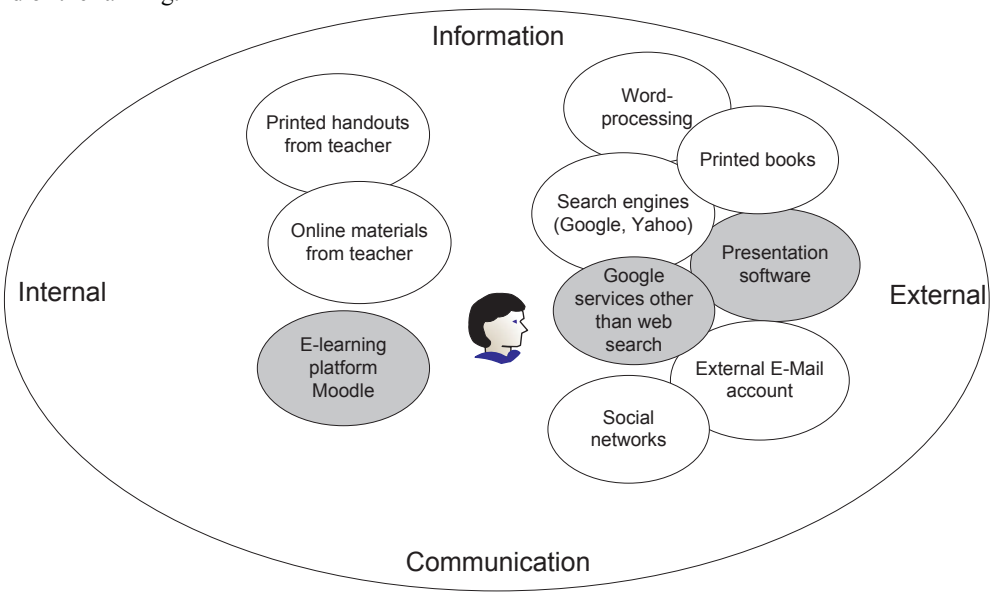

Figure 4: the top-ten accepted media services of UB students; The services which are only among the top ten of the Spanish sample and not among the top ten of the other countries are highlighted in grey.

The figure above shows, that UB students overall tend to prefer external to internal and information to communication oriented media services. However, there are also internal services which are highly accepted, especially class attendant media (hand-outs from the teacher and the learning platform Moodle). Among the external media, especially e-mail-services, software to create own content (Word processing and spread sheet software) and some ubiquitous web 2.0-services (Google, social networks) show high acceptance values. The following table lists all surveyed media services, their acceptance values are classified into three groups (high-medium-low acceptance):

High acceptance Rank 1-16	Search engines (3.74); E-mail account not from university (3.74); Word processing (3.53); Online materials from teacher (3.32); Printed books (3.25); Other Google services (not web search) (3.19); Social networks (3.15); Presentation software (3.13); Printed hand-outs from teacher (3.12); E-learning platform Moodle (2.95); Online dictionaries (2.90); Working with mobile device on campus (2.83); Electronic books (2.83); University intranet (2.83); Self-created digital records (2.81); Video sharing websites (2.80)
Medium acceptance Rank 17-32	Wikipedia (2.72); Instant messengers (2.72); Online exams and self-tests (2.71); E-version journals (2.70); Spread sheet software (2.67); Wi-Fi, WLAN on campus (2.67); Bibliographic databases online (2.62); University website (2.61); Print-version journals (2.59); Podcasts / video casts / iTunes (2.59); Online services of the university/faculty library (2.57); E-Book readers (2.54); Dictionary software on computer (2.54); AV- and Multimedia software (2.46); University e-mail account (2.46); Bibliographic software (2.39)
Low acceptance Rank 33-49	E-learning as part of the class (2.31); Online book stores (2.31); Online services of other libraries (not own university) (2.30); Computer labs on campus (2.25); Social bookmarking (2.23); Online materials from other universities (2.14); Recorded lectures (2.14); Mailing lists (2.11); E-learning platform other than Moodle (2.11); E-learning software (2.11); Weblogs (2.06); Virtual class in real-time (2.02); Virtual class in non-real-time (2.01); Newsgroups, internet forums (1.97); Simulations, interactive programs (1.88); Wikis with active participation as part of the class (1.84)

Table 2: Overview of the acceptance of 40 media services; mean values (0=very low acceptance – 4=very high acceptance) of all surveyed media and IT services.

Digital information media services like university library catalogue and electronic texts (e-books, electronic journals) also have already penetrated the students' learning environment on a significant level (see table below). E-learning-services such as learning platforms or wikis used in class are generally accepted from an average to a low level. Especially low accepted are e-learning services which require a participation of the students (wikis) or are technologically advanced (virtual classroom scenarios). Though there are a lot of compliances in the media acceptance of students from the surveyed countries, there also occur clear differences. Comparing the UB data with the surveys in Germany, Thailand and the Philippines it turns out that Spanish students could be – when it comes to media - particularly information and less communication-oriented as they show a distinctively individual and solitary learning behaviour (less use of social media; less learning with other students or in groups). The following media are particularly different accepted between the Spanish sample students from other countries:

Particularly **higher** acceptance at UB	Moodle; Other Google services (not web search); presentation software; Word processing; Google web search; E-Books
Particularly **lower** acceptance at UB	Wikis as part of the class; Online book stores; Wikipedia; Social networks;

Table 3: comparison of acceptance of media services of UB sample vs. samples from other countries

These differences emphasizes that UB students are particularly relating to information media and - at the same time - refraining from social media.

When looking at possible influence factors on the media use for learning, especially the general learning behaviour seems to play a key role. Other dimensions, such as sociodemographic factors, the educational biography and the access to media also show significant regression relationships with the acceptance of media for learning, though on a lower level.

Explorative analysis of the data by factor analysis, cluster analysis and multivariate regression analysis (methodology described in [24]) also revealed, that students who use media intensely with a special focus on text and information media are the ones that are especially successful during their study. At the same time, students who are generally averted to media as well as students who use media intensely but not very self-controlled/selectively are less successful regarding their grades and GPA. Hence, in the area of media the usage of text media - printed as

well as electronic - can be regarded as an indicator of study success, or to put it simple: students who use more text and information media are more successful.
Heavy media usage by students is often discussed in a negative way. It is commonly feared that spending too much time on the computer and using electronic media could distract students and promote procrastination. Though, analysis of the data hints to the opposite, that is, that students who use media very intense, but focused on learning are more successful than students who generally refrain from media. There were no negative relations between media usage and learning success found, except a slightly negative regression relationship between the usage of Facebook during free time and the GPA among the 3,200 Thai students that were surveyed.

4 Discussion

As the surveys of the MESHED-project now are running since more than three years and in different countries, collecting overall 7,000 samples, several trends can be figured out on a broad base of empirical data. This data shows, that the overall media usage patterns of the students seem to be relatively stable. Though, in certain areas also significant changes in the usage behaviour took place. These changes can be clustered to four general trends. Some of them are new, some of them already started already more than twenty years ago and now are spreading into new areas:
1. Externalization: students more and more shift from using internal to external services, e.g. from the university library catalogue to Google Scholar when searching for literature
2. Concentration:

- The usage patterns are consolidating and already often used media are even used even more, on the other hand little used media are used even less.
- Some big players are drawing over the usage from other services, e.g. the usage of Instant Messenger software is replaced by the chat feature of Facebook

3. Digitalization: There is a continuous shift from printed to electronic text that first started with scientific journals and later on moved to all relevant areas (textbooks, class attendant materials
4. Mobilization:

- A rapid spread of tablet computers, especially in the surveyed Asian countries is taking place
- A decrease of stationary computing (possession of desktop computers and stationary internet connections)
- An increase of mobile computing (possession of mobile internet connections, smartphones, tablet computers, notebooks and netbooks)

Regarding these overall international trends, the Spanish sample from UB deviates in two areas: first in the area of externalization, where, against the general trend, the learning platform Moodle seems to play a key role in the learning environment. Second, in the area of mobilisation, where UB students, like the surveyed students from other countries are already adapting mobile technologies on a same level, but at the same time still sticking to stationary computing and therefore using both technologies, mobile and stationary on a high level.
The result that students who use text and information media especially often also have significantly higher values concerning their self-estimation about study performance leads to the concideration, if universities should particularly encourage students in using these kinds of media. When it comes to strategic development, they also might focus on the text and information media type as it seems to be relevant to the students and efficient for study success. Inside this media type, in particular the improvement of electronic text services (textbook, reference books and journals) seems crucial for university media and IT strategy. Outside university, the integration of information services, for example Wikipedia and Google, could play a certain role.
Based on the collected empirical data the project led to the wording of future trends of media in higher education, which differ from other reports, such as the Horizon Project. In that context, the significant changes of media usage frequencies can be used for a future prognosis, assuming a linear regression relationship. By that, for example in the coming years students at KIT might use library catalogues less frequently (Grosch, 2012). Whether this trend is approximately linear or not needs to be validated in the KIT survey, that is running at the moment, by getting a third measure point. Looking at the existing data it can be assumed that internal service providers need to constantly

improve and develop their media services to keep up with the highly competitive external services provided by Google or other big players, as the significant decrease of the usage of the the universities own library catalogue, together with the increasing use of Google Books and Google Scholar hint to an overall long term shift from library services to Google and Wikipedia during information search and the use of electronic text. These processes will be closely watched by the follow-up surveys which are currently going on at different universities in several countries.

As there seems to be one exceptionally successful media user type who shows a preference for text media, the usage of text media, printed as well as electronic, could be considered as one indicator of study success. Students who are generally averted to media and students who roam around and use a lot of not established and innovative media seem to be less successful. Though these results need more validation, they are in tune with common empirical findings, as for example the basic psychological doctrine that the ability to read and write forms one of the basic pillars of the concept of intelligence.

When it comes to improving internal services, universities could also focus on class attendant media, for example by supporting teachers in providing class attendant journals or recorded lectures. The surveys showed, that teachers are spending a lot of time in creating class attendant media and students also require and appreciate these efforts. On the other hand, universities might think about the adequate effort in e-learning scenarios (virtual class etc.) and other services, such as wikis, weblogs or Twitter.

In the next years mobile computing seems to be a thriving trend that should be focussed by university strategy. New devices, like the rapidly spreading tablet computer and maybe also the new generation of eBook-readers could additionally fuel the dissemination of mobile learning and the use of electronic text by students. The running follow-up surveys already reveal rapid growth in the usage of tablet computers for studying. Also mobile internet flat rates and smartphones are spreading fast.

References

British Library & JISC. (2008). Google Generation Project - Work Package I - Trends in Scholarly Information Behaviour, Google Generation Project - Information Behaviour of the Researcher of the Future. http://www.jisc.ac.uk/whatwedo/programmes/resourcediscovery/googlegen.aspx. Last accessed October, 2, 2012.

Bronfenbrenner, U. (1979). The Ecology of Human Development: Experiments by Nature and Design. Cambridge, MA: Harvard University Press.

Bronfenbrenner, U. and Morris, P.A. (1998). The bioecological model of human development. In: W. Damon, R.M. Lerner, N. Eisenberg (ed.), Handbook of child psychology. Volume I: Theoretical models of human development, 1998. Hoboken: Wiley.

DeLone, W.H., and McLean, E.R. (1992). Information Systems Success: The Quest for the Dependent Variable. Information Systems Research 3(1), Pp. 60-95.

Ehlers U.D. (2004). Quality in e-learning from a learner's perspective. Third EDEN Research Workshop 2004, Oldenburg, Germany.

Ehlers, U.-D. (2004). Quality in ELearning From a Learner's Perspective. European Journal for Distance and Open Learning. http://www.eurodl.org/materials/contrib/2004/Online_Master_COPs.html. Last accessed October, 2, 2012.

Gidion, G. and Grosch, M. (2012) Welche Medien nutzen die Studierenden tatsächlich? (German), Forschung und Lehre 6(12). http://www.forschung-und-lehre.de/wordpress/Archiv/2012/ful_06-2012.pdf

Gidion,G. ,Fernando, L., Grosch, M., and Meadows, K.N., (2013) Media Usage Survey: How Engineering Instructors and Students Use Media. Karlsruhe Institute of Technology 2University of Western University.

Grosch, M. (2011). Designing and testing a theory model for IT systems acceptance in Tertiary Education. In P. Sandhu, D. Delcore (Ed.) International proceedings of PSRC (Pp. 335-338). Pattaya: Planetary Scientific Research Centre.

Grosch, M. (2012). Mediennutzung im Studium. Eine empirische Untersuchung am Karlsruher Institut für Technologie (German). Aachen: Shaker.

Grosch, M. and Gidion, G. (2011). Mediennutzungsgewohnheiten im Wandel (German). Ergebnisse einer Befragung zur studiumsbezogenen Mediennutzung (German). Karlsruhe: KIT Scientific Publishing. http://digbib.ubka.uni-karlsruhe.de/volltexte/1000022524. Last accessed October, 2, 2012.

Grosch, M. (2012). Mediennutzung im Studium (German). Eine empirische Untersuchung am Karlsruher Institut für

Technologie. Aachen: Shaker.
Grosch, M. (2012). About Students' Use of Web 2.0 and Mobile Computers for Learning – Results of a Survey at King Mongkut's University of Technology Thonburi, Thailand. In Proceedings of International Conference on e-Education & Learning Technnologies (77-81), Singapore.
Grosch, M. (2012) Library services in the media environment - A students' perspective, New Library World, Vol. 113 Iss: 9/10
Grosch, M. and Philips, B. (2012). Media usage by Thai international students. In C. Dan (Ed.) International proceedings of economics development and research (vol. 27). E-education, e-business, e-management and e-learning (Pp.64-68). Singapore: International Association of Computer Science & Information Technology Press.
JISC (2008). Google Generation Project - Information Behaviour of the Researcher of the Future - a ciber briefing paper. http://www.jisc.ac.uk/media/documents/programmes/reppres/gg_final_keynote_11012008.pdf. Last accessed October, 2, 2012.
Johnson, L.F. (2004). 2004 Horizon Report. Austin, TX: The New Media Consortium. http://www.nmc.org/pdf/2004 Horizon Report.pdf. Last accessed October, 2, 2012.
Johnson, L.F. and Smith, R.S. (2005). 2005 Horizon Report. Austin, TX: The New Media Consortium. http://www.nmc.org/pdf/2005_Horizon_Report.pdf. Last accessed October, 2, 2012.
Johnson, L.F. and Smith, R.S. (2006). 2006 Horizon Report. Austin, TX: The New Media Consortium. http://www.nmc.org/pdf/2006_Horizon_Report.pdf. Last accessed October, 2, 2012.
Johnson, L.F., Levine, A. and Smith, R. S. (2007). 2007 Horizon Report. Austin, TX: The New Media Consortium. http://www.nmc.org/pdf/2007_Horizon_Report.pdf. Last accessed October, 2, 2012.
Johnson, L.F., Levine, A. and Smith, R.S. (2008). 2008 Horizon Report. Austin, TX: The New Media Consortium. http://www.nmc.org/pdf/2008-Horizon-Report.pdf. Last accessed October, 2, 2012.
Johnson, L.F., Levine, A., and Smith, R.S. (2009). 2009 Horizon Report. Austin, TX: The New Media Consortium. http://wp.nmc.org/horizon2009/. Last accessed October, 2, 2012.
Johnson, L.F., Levine, A., Smith, R.S. and Stone, S. (2010). 2010 Horizon Report. Austin, TX: The New Media Consortium. http://wp.nmc.org/horizon2010. Last accessed October, 2, 2012.
Johnson, L., Smith, R., Willis, H., Levine, A., and Haywood, K., (2011). The 2011 Horizon Report. Austin, Texas: The New Media Consortium. http://www.nmc.org/pdf/2005_Horizon_Report.pdf. Last accessed October, 2, 2012.
Johnsson-Smaragdi, U. (1994). Models of change and stability in adolescents' media use, in K.E. Rosengren (Ed.). Media effects and beyond. (Pp. 89 – 116). London: Routledge.
Kvavik, R., Caruso J.B. and Morgan, G. (2004). ECAR Study of Students and Information Technology, 2004: Convenience, Connection, and Control. http://www.educause.edu/ECAR/ECARStudyofStudentsandInformat/158574. Last accessed October, 2, 2012
Kvavik, R. and Caruso, J.B. (2005). ECAR Study of Students and Information Technology, 2005: Convenience, Connection, Control, and Learning, P. 93. http://www.educause.edu/ers0506. Last accessed October, 2, 2012..
Papp R. (2000). Critical success factors for distance learning. Paper presented at the Americas Conference on Information Systems, Long Beach, CA, USA.
Russell, T.L. (2001). The No Significant Difference Phenomenon: A Comparative Research Annotated Bibliography on Technology for Distance Education. North Carolina State University. The bibliography is continued online: http://nosignificantdifference.wcet.info/index.asp. Last accessed October, 2, 2012.
Selim; H. (2007).Critical success factors for e-learning acceptance: Confirmatory factor models. Computers & Education (49), Pp. 396–413.
Sharpe, R., Beetham, H., Benfield, G., DeCicco, E. and Lessner, E. (2009). Learners Experiences of Elearning Synthesis Report: Explaining Learner Differences. http://www.jisc.ac.uk/media/documents/programmes/elearningpedagogy/lxp2finalsynthesis.pdf. Last accessed October, 2, 2012.
Smith, S.D., Salaway, G. and Caruso, J.B., (2009). The ECAR Study of Undergraduate Students and Information Technology, 2009. http://www.educause.edu/Resources/TheECARStudyofUndergraduateStu/187215. Last accessed October, 2, 2012.
Soong, B. M. H., Chan, H. C., Chua, B. C. and Loh, K. F. (2001). Critical success factors for on-line course resources. Computers & Education, 36(2). 101–120.

O'Reilly, T. (2005). What is the Web 2.0?: Design Patterns and Business Models for the Next Generation of Software. http://www.oreilly.de/artikel/web20.html. Last accessed October, 2, 2012.

Volery T., & Lord D. (2000). Critical success factors in online education. The International Journal of Educational Management, 14(5), 216–223.