Have they changed? Five years of survey on academic net-generation

Eles mudaram? Cinco anos de pesquisa sobre acadêmicos da geração net

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Abstract: At Graz University of Technology (TU Graz) a questionnaire amongst freshmen is carried out each year since 2007. Aim of this poll is to check IT and Web 2.0 competences and skills of the new students coming to TU Graz in order to adapt the e-learning services for their study at TU Graz. Furthermore the results mirror current trends and changing behaviors of young people said to be the net-generation often postulated to which we and our teachers will face to. After five years of investigations time has come to take a look back and reel up processes and progresses not only because five years match the standard duration of a study at TU Graz. Which trends have been established, which assumptions did not arrive, what happened totally unexpected? This paper targets the main changes within the last five years due to this subject. It compares the five study years and outlines the current study results of 2011 in. One of the main results over five years is that the net-generation did arrive but slowly adapt their study life to what they are already used to do in private.

INTRODUCTION

The Internet world is a changing. New mobile devices spring up like mushrooms within shorter and shorter time frames being better than the rest before, handle more different things at the same time, trying to be all in one. On the other side we today can chat, like, phone, post, upload, poll, play, and much more using only one well known social platform. Communication and collaboration has become a child´s task made as easy and voluntarily as possible and therefore it must also be taken a look to todays' learners. Mark Prensky (Prensky, 2001) wrote, "Our students have changed radically. Today's students are no longer the people our educational system was designed to teach". And he aroused a worldwide discussion whether our children belong to a kind of net-generation and playing, working, or even learning in a complete different behavior or not. Prensky mentioned that today's children live in a fully digitalized world with access to any information in real time. Therefore we have to rethink education, because our system will not be appropriate any more. Since then different terms have appeared to describe this new generation - "Net-

Generation" (Tapscott, 1997), "Digital Natives" (Prensky, 2001), "Generation @" (Opaschowski, 1999) or "Homo Zapiens" (Pelevin & Bromfield, 2002) as well as different research studies have tried to approve its existence. Oblinger (Oblinger & Oblinger, 2005) (Oblinger, 2005) described that this generation has different habits like multi-tasking and new ways of communication, but there was no proof of this assumptions. Green & Hannon wrote that "the use of digital technology has been completely normalized by this generation and it is now fully integrated in their daily life." (Green & Hannon, 2007). All this first research studies just argued in the same way, mostly by doing some observation and the imagination that the youth of today grow up in a world where Internet technology just exist. A child born later than 2000 will never understand that there can be a world without any Internet or has been. On the one side this argument seems to be logical and consequential not only for people in the developed civilized world, but on the other side there is no answer to the question whether the possibility of real-time information access and the availability of technology will have lasting effects on the learning behavior of young modern people. More precisely, are learners of today really different to learners of yesterday or is the influence of technology just over estimated?

Since 2005 a number of different studies exactly address to this research question. Solid data and associated theories should describe learners and point out the appropriate teaching strategy. Conole (Conole et al, 2006), Bullen (Bullen et al, 2008), and Margaryan (Margaryan, 2008) pointed out that students are using all these new technologies in their daily life but not really for their learning processes or within their educational institutions. In 2008 a meta-study done by Schulmeister (Schulmeister, 2009) (Schulmeister, 2010) concluded that there are some changes in the immediate technological environment but there is no change as it was announced by Prensky & Co in student's learning behavior. Different big studies in the German speaking area pointed out that importance of the World Wide Web for the youth increase (JIM, 2008), but the active use of Web 2.0 technology is quite moderate (Kleimann et al, 2008). Therefore it is of high importance to consequently watch the behavior of students towards their use of modern technology and Web 2.0 offer for learning purposes.

The discussion in general as well as the interest in getting solid data for diagnosing trends and making predictions leads to long-lasting study amongst freshmen and their IT-skills and competences at Graz University of Technology (TU Graz) in 2007. Since then every year a study has been carried out amongst freshmen at TU Graz to see whether the "new generation" has just arrived at university or not. This publication compares data of 5 years collected, reveals the real facts, and displays some remarkable results as well as a slowly changing student community. The target aim is to answer the research question: Are there remarkable differences within one university generation?

THE STUDY

As mentioned above the study among freshmen coming to TU Graz takes places for the very first time for freshmen of the year 2007. Nowadays it can be stated that this survey is a traditional one done in the same way as all the years before. The Department for Social Learning (DSL) as part of the Information Technology Services (ITS) at TU Graz is responsible for carrying out the so-called "Welcome Days". Within these two days the TU Graz presents all its services, service institutions, and more information for a successful study at TU Graz to their freshmen. In the end of the second day each student is asked to go through a questionnaire on its base DSL analyses the research question. The students are asked to give DSL his/her personal feedback to the event "Welcome Days" itself as well as to answer different questions about his/her Web 2.0 usage and their technological equipment regarding laptops, mobile devices, and Internet accessibility. In order to guarantee a maximum sample of questionnaires filled out the survey is done as paper pencil form. In total DSL has collected and analysed n=3490 data sets since 2007 (n^{2007}=578, n^{2008}=821, n^{2009}=757, n^{2010}=702, and n^{2011}=632). Due to the fact that there have been a couple of changes towards Web 2.0 within the

last five years the questionnaires have been adapted to those developments to get the most of it. Nevertheless the main focus remained the same but some current aspects have been added, such as the rush of Facebook, the come up of e-readers, or the multiple availabilities of mobile technologies (think of iPhone and Android based smartphones) as well as accessibility to the mobile Internet. Therefore each year of the study has a slightly different main subject targeting. In the beginning year 2007 the study addressed the so to say overall question "Has the net-generation arrived at the university" (EBNER et al, 2008) and had to be negated none the less. Five years later we ask again and take a look back at the progress.

Since 2010 we also take care on a deeper statistical analysis (EBNER et al, 2011a). This analysis gives us insight into correlations and dependencies between multiple values. Again we used the PCA ("Principle Component Analysis") method resulting correlation-matrices and the HCA ("Hierarchical Cluster Analysis") method for this purpose. With these methods we find out and visualize the impact of variables on each other.

RESULTS AND FINDINGS OF 2011 SURVEY

Which Trends Can be Seen Towards Technological Equipment?

The question according to technological equipment is a good example for how fast things develop and change. We had to adapt the question each year to catch the newest trends according to devices. This year (2011) we kept also an eye on different operating systems of phones and smartphones. The need for splitting into different e-readers we did not assume as very important due to the fact that in German speaking countries e-readers still wait for their boom though the future is meant to be electronic (STATISTA, 2011a). Regarding mobile phones following two questions are asked: First the student had to answer whether

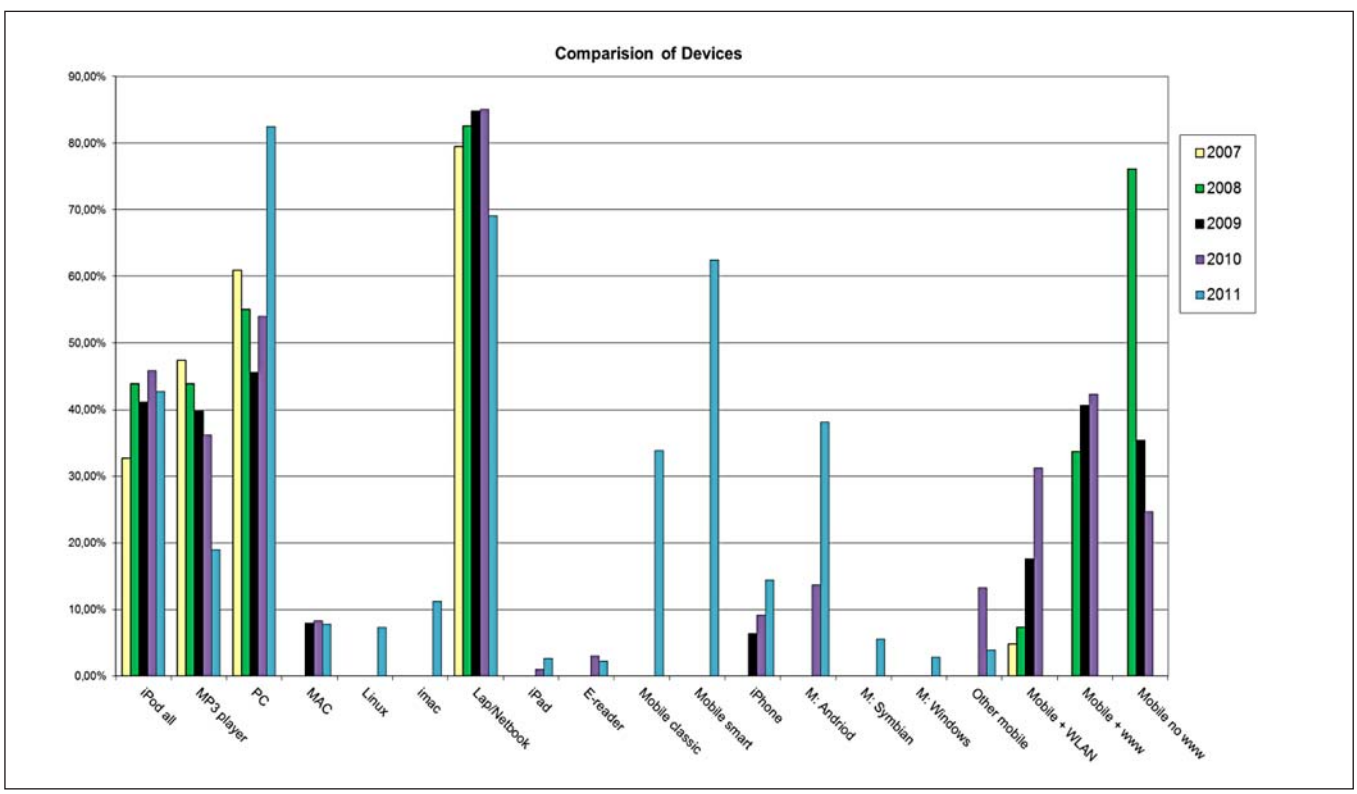

Figure 1: Comparison of devices used by first year's students at TU Graz between 2007 and 2011;

Selections "Linux", "iMac", differentiations on mobile devices ("Mobile classic", "Mobile smart", "M: Symbian", "M: Windows") are new to the survey since 2011; the selection "Other Mobiles" of 2010 includes the new selections "M: Symbian" and "M: Windows" too and therefore nearly stayed the same; the selections "Mobile + WLAN", "Mobile + www", and "Mobile no www" have not been asked in 2011 survey

she/he uses a smartphone or a classic one; the differentiation was argued with the facilities the mobile has such as touchscreen, enhancement via apps, support of broadband, and more. Though this kind of classification is not sufficient the answers given are very clear. Smartphones are much more popular (nearly twice) than classic mobiles. The second question addressed the distinct smartphone operating system in use. As figure one tells the Android system is in favour by nearly 40% followed by Apple´s iOS through iPhone (14%). All other smartphone systems together just reach the 10% level. The comparison between the five years of survey is especially in this subject difficult. The splitting into "Mobile with or without Internet" has become obsolete, because only a very few mobiles do not offer any internet access any longer. According to the operating system we can suppose that the trend to "Mobile + WLAN" holds on and tops last year´s values.

The unbowed increase and spread of smartphones can be the reason for the turnaround according to laptops and netbooks and the very unexpected and enormous gain in PCs. Compared to 2009 they nearly doubled. If this change holds on we can postulate for the future that the more smartphones and maybe also tablets are able to take over laptop functionalities the less laptop or netbooks will be used. As a result of that people prefer to have a workstation rather than a couple of different additional mobile devices offering same functionalities. For the mobile phone is a have to the laptop or tablet PC turns dispensable. This trend is proved by the facts of Statista (STATISTA, 2011b). 28% of people living in Germany use their mobile phone for internet access in 2011, which is a strong growth of about 80% since 2010 and a doubling since 2008. By the way, the results for the usage of mobile phones are independent from age and sex of the polled students. But according to other equipment the PCA/HCA analysis shows us that iPods are more likely used by younger, female students; this group also has less Linux computers than others. In that relation a special focus must be set on Apple users. The iMac is slightly more popular than Apple´s workstation variant. Statistically we can see that those people using Apple systems for computing also have an iPhone for phone accessibility. Nevertheless the iPad still remains "quiet"; it seems to be too expensive for freshmen according to similar possibilities. And last but not least this year we had the (expected) breakdown of MP3 players in difference to the stable iPods.

Which Trends Can be Seen Towards Communication Behavior?

As in the year before (2010) again in 2011 we have a most interesting movement towards the communicational habits of freshmen. Again Facebook concretes it´s pre-eminence with a further increase of 10% up to 80% usage. Though Facebook has diminishing influence on e-mailing we can see (figure 2) a massive loss of using newsgroups for communication. Furthermore Facebook and Google+ shorten the rate for other social community usage. The situation with Google+ is similar to the one of Facebook in 2008 when Facebook had a spread of 16%. The year after (2009) it rushed to nearly 70% whereas StudiVZ (the "forgotten" social platform for primarily German speaking countries) reacted vice versa. It too will be of future interest whether Skype can hold its increase due to the fact that Facebook and Google+ offer video communication since July 2011. Other instant messaging or VoIP providers go down again. The slight rises of Twitter and weblogs maybe point to the fact that people communicate and participate more often in general. And in fact, if a total of all comparable communicational ways is accumulated (without the value of "SMS" and "Forum") we have an increase of approximately 10% in general communicational behaviour since last year (2010). This simple calculation is approved by the statistical analysis using PCA and HCA methods, which carry out that those who use Facebook, definitely use other communicational ways too! In other words: The 20% of freshmen that do not use Facebook are using other ways for communication stronger than those using Facebook. We can state that Facebook has a long-term beneficial influence on general communication.

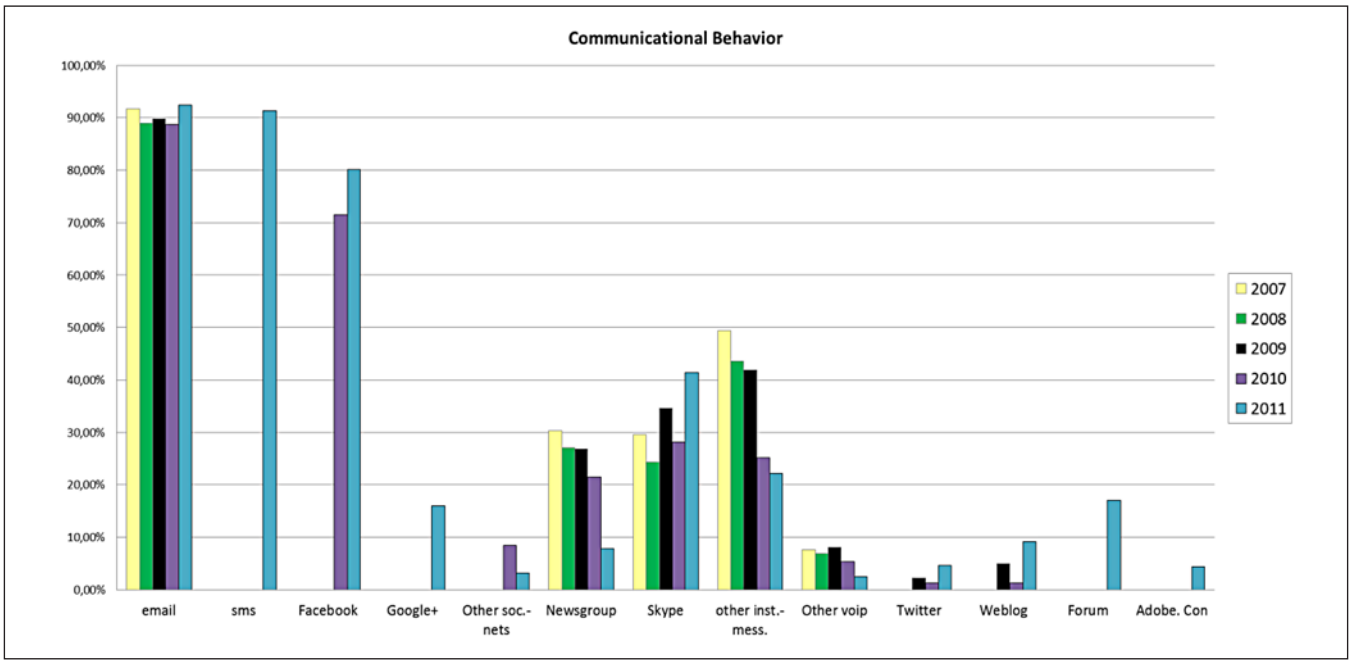

Figure 2: Comparison of communication behaviour of first year's students at TU Graz between 2007 and 2011
Values similar to answers given for "often" plus "daily" use; the selections "SMS", "Google+", "Forum", and "Adobe. Connect" are new to the survey since 2011

Which Trends Can be Seen Towards Internet Access at Study Home?

The access to internet at study home changed for the benefit of modem access at mobile costs which can be seen as a continuation of last year´s (2010) statement that the trend to mobile internet at study home has stopped (Ebner et al, 2011a). The ADLS usage stays unaffected over the years and is in no competition to the other accessibilities. The intersection of general Internet access shows in 2011 98% of all students have at least one (2010 88,6%).

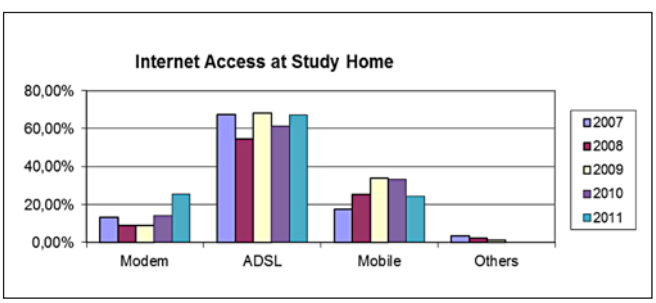

Figure 3: Comparison of Internet access at study home of first year's student at TU Graz between 2007 and 2011

Which Trends Can be Seen Towards the Usage of E-learning Platforms at Secondary School Level?

According to the usage of e-learning platforms at secondary school level we added a couple of questions and redrafted this part of the questionnaire. New to this year´s (2011) survey are the selections "Office", "Learning on PC", and "Learning with Web". The results (see figure 4) show us that working and learning with the PC is very common; there are only few learners left never using a PC for learning purposes. Moreover standard office software is even in more practice than learning on PC. The web is only used by 14% for learning purposes as is the usage of LMS still low though the Austrian Federal Ministry for Education, Arts and Culture recommended Moodle to be used for that aim a couple of years ago. Nevertheless, we can state that students do have the PC integrated into their schooling life. Offers of the school towards e-learning keep in limits and are slowly rising.

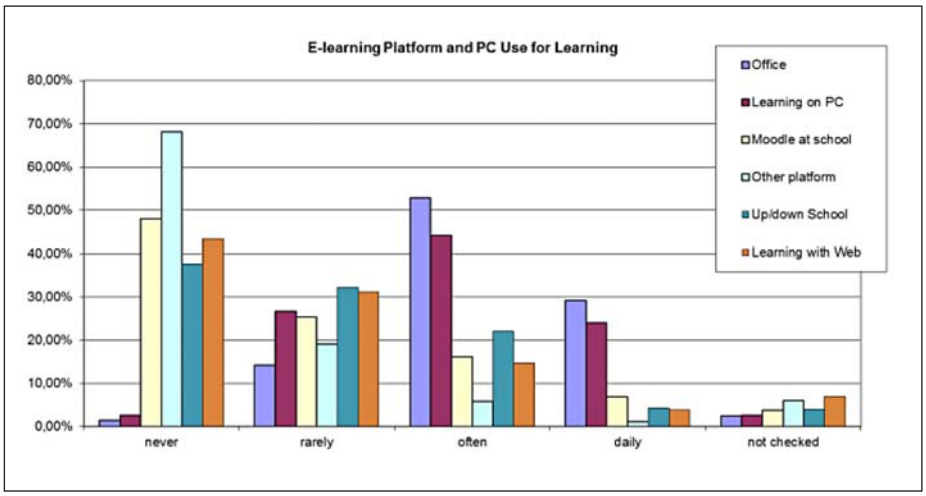

Figure 4: Comparison of usage of e-learning platforms and PC in general for learning efforts of first year's students at TU Graz 2011; selections "Office", "Learning on PC", and "Learning with Web" are new to the survey 2011

Which Trends Can be Seen Towards Web2.0 Competence?

The final part of the survey covers the Web 2.0 competences. For that we listed a series of most relevant Web 2.0 platforms structured by similarity of purpose (for instance: applications for communication, applications for online desktop computing …). We adapted last year´s mode of splitting each element of that list to be answered in different relations. So for each element the student has to indicate whether she/he "knows" it, how intense the usage is ("rarely", "often", or "daily"), whether she/he uses it "actively" in the meaning of editing, and how strong she/he uses it for learning purposes ("rarely", "often", or "daily").

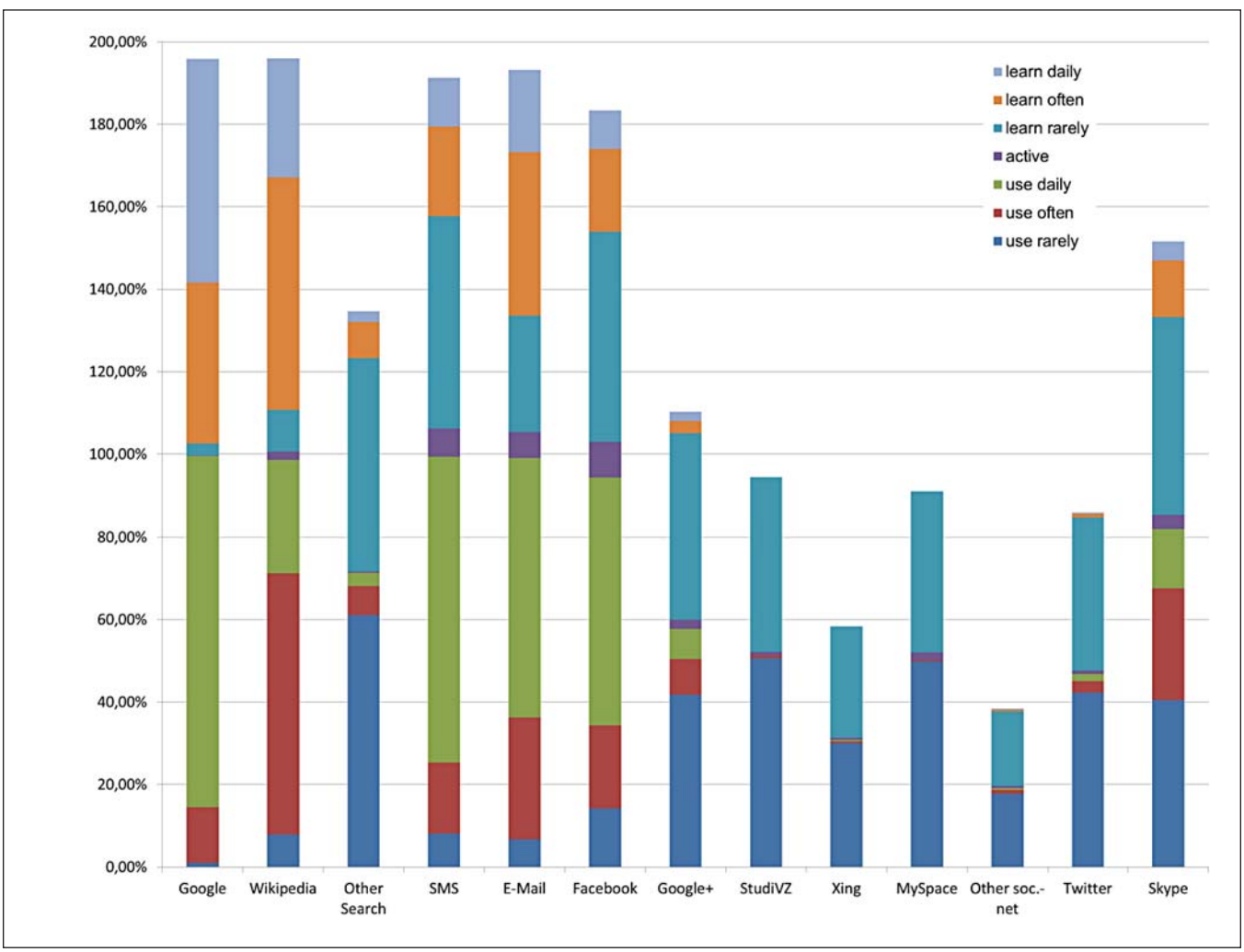

Figure 5: Usage of Web2.0 and Internet offers of first year's students at TU Graz in 2011, part 1

Figure 5 and figure 6 hold the results except selection "known". We kicked that selection off the figure because this sub question led to misunderstandings among the students. Though a description to this question was given it was not clear enough for them whether "knows" means "just knowing but not using it" or "knowing in general". In order we had no selection "not knowing" implemented it was too confusing to have a precise interpretation of those answers given. Furthermore the selection "active" induced misunderstandings and will be revised for future surveys. The values exceed the 100% level because of that multiple answer possibility given for one item.

As an example we can pick the first element "Google" and see (figure 5) that it is used daily by approximately 85% (nearly everybody uses Google daily or often); even more we see that Google is used by 55% daily for learning (90% for daily or often learning)! Figure 5 and figure 6 display very impressively which Web 2.0 platform are in major use for learning purposes. Even other search engines but Google have a greater impact on learning habits than most of other services. Only Google and online calendar applications are used more "daily" than "often" for learning. Compared to last year´s results (Ebner et al, 2011a) we have a general increase in the usage of Web 2.0 platforms for learning efforts. Since 2011 only Wikipedia, YouTube have been considered seriously to be used for learning purposes. This year the study shows that students have learning intentions (often or even daily) for nearly any of the elements questioned. This is a clear signal of a rising Web 2.0 awareness! Furthermore it can be pointed out that online desktop and editing

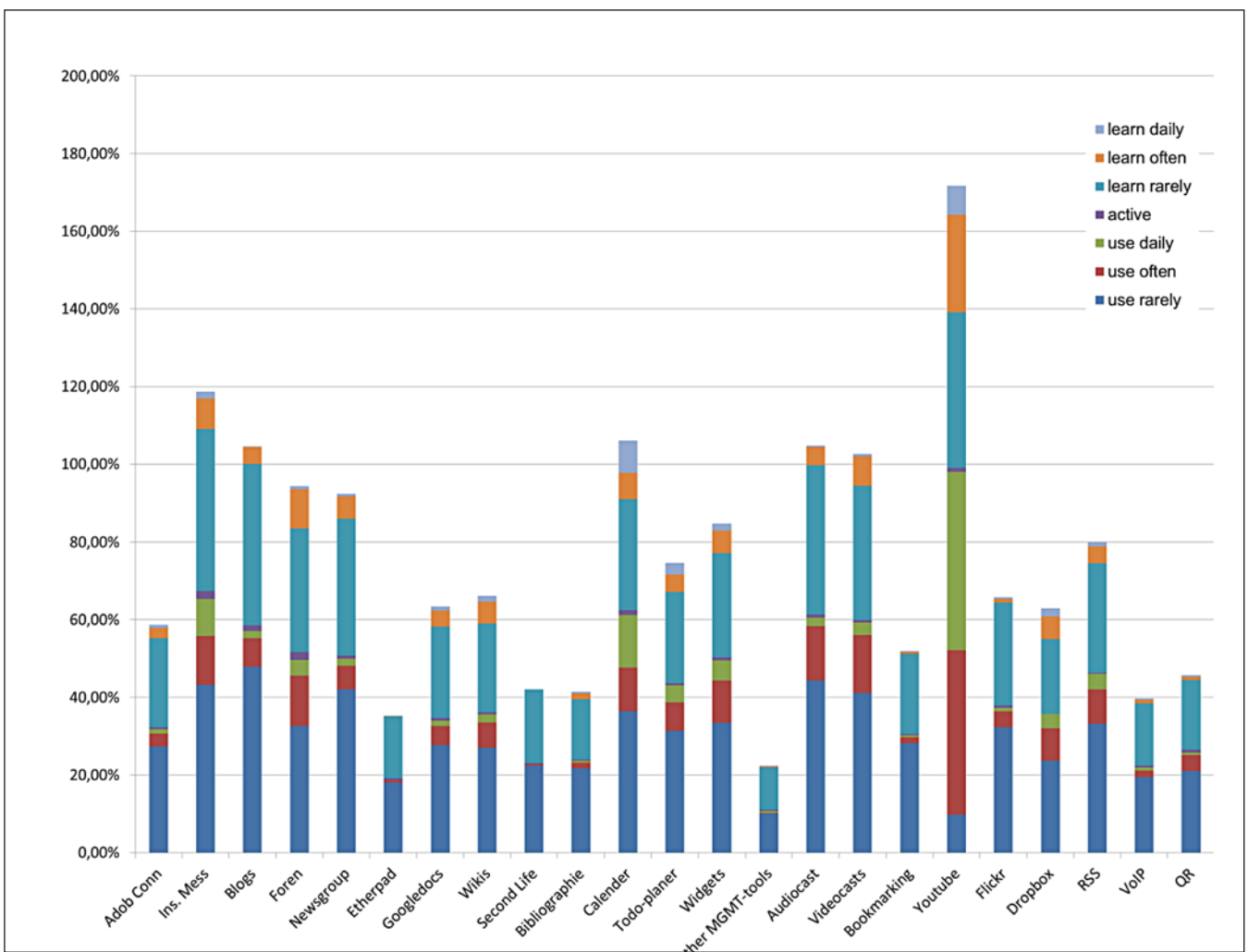

Figure 6: Usage of Web2.0 and Internet offers of first year's students at TU Graz in 2011, part 2

applications gain a growth for learning efforts too. For example, Google Docs is not used by a majority but those who use it also discover the potential for collaborating and schooling aspects, which is very similar to the results for Dropbox. Rather "old-fashioned Internet" offers such as wikis, blogs, newsgroups, and forums delight a revival for learning aims though for example newsgroups had to suffer a general break-in. Some of these elements are nearly as much used "often and daily" for private purpose as for learning aspects; compare Wikipedia, Adobe Connect, Newsgroup, GoogleDocs, Wikis, and Dropbox which therefore seem to have a distinct image, reputation to their users as learning tools. Moreover, online management tools such as todo-planer or calendar are too used for learning efforts, whereas e.g. Etherpad still is of no importance at all.

LOOKING BACK – LOOKING FORWARD

In the following a look back is done at any single survey year since 2007, their main results, conclusions, and statements. Furthermore those past results are compared to the current state of the individual aspect pointed out. On base of that the central progressions during these five years which can be seen as one university generation are worked out.

In the beginning of the survey we wanted to find out whether the net-generation already has arrived at university or not. Is it possibly to argue on base of well polled students that the learning behaviors of today's students have changed in the meantime? How deep is the impact of Web 2.0 on learning habits? Is there an impact or do students totally switch between a private live enhanced with Internet and a study live never get in touch with Web 2.0.

Starting with the study of 2007; these are the main results of that year (Ebner et al, 2008):

- In 2007 the main focus was on the different devices and equipment students bring to university daily life. More than 90% of the students have at least one Internet access at their study-home (but not a mobile one) and more than 80% own a laptop. Nearly every third student has a mobile phone with Internet access and nearly 70% have some kind of distinct audio player. In reaction to the equipment of the students today all learning and teaching areas at TU Graz provide WLAN access, some lecture rooms have power supply at each seat, and the number of lectures recorded for podcast services is stronger rising than ever. Even there is a project going on to offer fully automated recording of lectures in future for TU Graz.

In 2008 the dawning of the communicational change began (Nagler & Ebner, 2009):

- In 2008 writing e-mails, participating in different chat rooms as well as in discussion rooms were part of students' daily life. Skype and VoiceOverIP were still rare in use but the social community called "StudiVZ" (for german speaking countries) resounded throughout. Today the way students communicate have changed. E-mailing and SMS remain the most favored ways of getting in contact. StudiVZ is no longer of interest even not known by 35% of the freshmen. All other communicational ways suffer from Facebook except Skype, which seems to benefit from Facebook. Nevertheless people communicate over the Internet more than ever before.
- In 2008 Web 2.0 meant to be Wikipedia, YouTube and "StudiVZ" mainly used for private activities and only less for learning. Today "Web 2.0" still is mainly Wikipedia and YouTube but a lot of different applications and offers todays Web holds are in use for learning too now. We definitely can realize an increase towards that aspect. Web 2.0 has become interesting for learning purposes at all.
- In 2008 e-learning was not established at secondary school level area-wide. Learning Management Systems (LMS) were sparse known by 2007 students. Today LMS are put on a level with the platform Moodle which is

more or less used by secondary schools in Austria since the Austrian Federal Ministry for Education, Arts and Culture recommended and maintained it in the meantime. To work with the PC and the Web for schooling has become normal. At TU Graz the LMS called TU Graz TeachCenter is in heavy use and established to be a powerful platform for any kind of teaching and learning aspects done using Internet.

In 2009 a couple of trends were to be seen (Ebner & Nagler, 2010); the net-generation woke up:

- In 2009 the trend to more mobility was to be seen. Today this trend seems to have reached a climax, a satiation. Mobile Internet is given but not further broaden; it has become usual. Even more, there is a decrease of multiple mobile devices but an increase of smartphones trending to replace other equipment.
- In 2009 the passive usage of Web 2.0 applications strongly increased. Today still the passive usage increases, but the active one too as said before. There is a general stronger usage of Web 2.0.
- In 2009 the usage of videopods and audiopods doubled compared to the year before. Today the important role of podcasts and recordings for learning is very well known. There are several attempts and strategies as well as successfully working settings for automated recording of lectures across Austrian universities (Nagler et al, 2011).
- In 2009 social communities boomed in general but Facebook had not replaced other communities or ways of communication so far. To indicate values of that year, StudiVZ still was the most popular community in Austria (and German speaking countries as well) hiked from 70% in 2008 to 80% then, Facebook rocketed from 16% to incredible 67%, MySpace gained to 55% from 45% as well as Xing from 5% to 12%. Even other communities enjoyed a doubling up to 8% in 2009. That meant that students got used to online editing practices more and more; the acceptance of Web2.0 was strengthened, the way for an online desktop working environment has been paved. Today there is nothing but Facebook anymore; Google+ has not reached mass popularity, even is unknown by 30%. Not only to meet such requirements for online desktop working DSL launched an overall platform for students to manage their personal study electronically represented, the first Personal Learning Environment "My TU Graz" (Ebner et al, 2011b) in spring 2011.

Last year´s survey (Ebner et al, 2011a) first of all showed the dominance of Facebook due to many aspects. Facebook has taken in a leading part according to social communities, communication ways, and usage of Web 2.0 customs. The rise of e-reader devices cannot be stated so far. This year´s survey underlined the special positive influence of Facebook on communicational behavior. Communication is more important than ever. Too Web 2.0 slowly moves to a serious part in the field of learning of students. This year (2011) we have for the first time evidence of a remarkable usage of Web 2.0 possibilities in general.

DISCUSSION AND CONCLUSION

The annual survey done by DSL of TU Graz among freshmen reflects the changing habits of our youth according to their Web 2.0 competence in general and for learning skills since 2007. During that term a lot has changed. We now can state that the net-generation already arrived not only due to technological devices but also in the usage of them and of Web 2.0 for learning efforts. The main steps during these five years can be seen as follows:

- LMS are in stronger use at secondary school level – more acceptance and known skills for university usage
- Devices and equipment are in frequent use and became more

- Mobile Internet is strengthened
- Facebook changed the way of communicating
- Facebook leads the way to get used to Web 2.0 applications in general
- Web 2.0 applications finally start to influence learning behaviour

If we take a look back to 2007 the change is indeed interesting. In 2007 lot of discussions and research studies concluded that there is no net-generation and students are learning in the same way as years before. Nowadays it can be summarized that many new devices with mobile Internet access become part of students' daily life. Due to this fact communication with the help of Internet technologies is increasing and quite usual. The ubiquitous access to the World Wide Web strengthens the usage of Web 2.0 platforms even if students do not realize them as a "special kind" of technology. Finally it can be concluded that the wording net-generation is maybe not adequate, but there were remarkable changes in the last years. Students of today are much more addicted to Web technologies and recognize Internet as a stable service all day long. Maybe the most interesting fact of the last years is that learners did not only get connected, but get a technology allowing communication in various ways. Therefore it must be asked if in future the net-generation is replaced by a communication-generation (c-generation)?

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