

Małgorzata Pańkowska

University of Economics in Katowice

SOCIALLY AWARE COMPUTING SURVEY RESULTS

Introduction

Mobile platforms and computing devices such as smartphones, tablets, notebooks are very popular and essential to human interactions. At universities, students store personal data and implement the software in very short time due to diversification of services and mass production of information communication technology (ICT) tools. This paper aims to reveal the students preferences towards mobile devices and students' willingness to use new media. The paper covers analysis and discussion on the student preferences survey results. The full-time and part-time studies students on bachelor and master level at University of Economics in Katowice took part in the survey. The survey was done in 2013 and repeated in 2014. The survey results seem to be useful for the further evaluation of security, accessibility and scalability of the new media application at universities.

Social awareness in ICT environment

Nowadays, students are entering a new computing era where mobile computing and social networking have combined into mobile social networking – a means for people to socialize and connect directly through their mobile phones. They can easily communicate their thoughts and share them with others using blogs and social networking sites such as Facebook and LinkedIn. According to Chin and Zhang, mobile social networking makes the mobility an integral part of social networks and lifestyles [ChZh14]. It combines distributed content sharing, social networks, sensor networks, ambient technologies and pervasive computing together on the phone in order to provide an integrated experience. According to Yu and Zhou, social awareness is a concept from sociology and it is used to describe the capability of social communication [YuZh14]. In the age of rapid ICT development, social awareness refers to sensing and reacting to social context by computer systems.

The system and social awareness can help people understand the current situation, improve their social communication skills and facilitate efficient social interaction. Socially aware computing emphasizes intelligence assistance and support of human behaviours and social interaction from the individual and society perspectives respectively. Socially aware computing is oriented to leverage large-scale, dynamic, continuous and real-time sensory data to recognize individual behaviours, discover group interaction patterns, and support human communication and collaboration.

The large number of various sensing devices, such as ubiquitous sensors (e.g. RFID, motion sensors, microphones, cameras, etc.), combined with email and Web (e.g. social network sites, blogs and Wiki) offer a lot of data for analyzing human behaviour and interaction. Mobile social networking is becoming a new research domain to show the power of merging social networking and mobile computing. It will revolutionize social networking by enabling anytime anywhere social interaction and a higher degree of intelligence. Motivated by the observation that the explosive growth of social networks such as Facebook and Twitter, the popularization of smartphones such as the iPhone, and the rapid evolution of sensor networks provide an opportunity to achieve a more comprehensive understanding of the context surrounding a user in a given environment [ZYGW14].

BYOD strategy

During the development of mobile devices and services the consideration of market offers plays an important role. Inadequate market orientation is the main reason of failures in the development of mobile services. However, the business considering enterprise wide process mobility requires a mobility strategy. The mobility strategy should guide operations and technology employees through the process redesign, application design, and implementation of the mobile enterprises systems. Alag argues that mobility strategies depend on factors, such as the business nature, strategic goals, need for process mobility, existing IT infrastructure and financial budgets [Alag06].

Mobility strategies are unique for enterprises and cover many important problems (e.g. risk and expected benefits of mobile devices usage, Bring-You-Own-Device (BYOD) approach implementation). Beyond that, making decisions and quantifying risks about mobile devices is hard without good investigation of the mobile devices' usage in a business organization. Some organizations permit end user to take care of device management, but some may want more protec-

tion. Anyhow, the business organization should be able to track, monitor, and control mobile network usage for business purposes. For example, if any of the users work with critical and unique data, they should consider using a backup and recovery solution. BYOD approach is a recent idea to exploit the personal communication devices for the work-related tasks. Although some business organizations have for years provided smartphones, laptops and tablet computers to employees, nowadays, personally-owned mobile devices are permitted to access the organization's networks and data.

The obvious advantage for the enterprise is cost savings achieved by not having to purchase these employee-owned devices. According to the Foresights Workforce Employee Survey, Q4 2011 in North America and European Union countries 57% of users choose work devices themselves and spend their own money. For the netbooks, it is 51%, for tablets it is 48%, for laptops it is 41%, but for PC desktops it is only 16%. The BYOD-specific security and control issues are as follows: protection of sensitive data and intellectual property, protection of networks to which BYOD devices connect, responsibility and accountability for the device and information contained on it, removal of the data in case of the device loss, malware protection, ensuring that employee-owned devices are properly backed up at all times [KeKa12].

Silva presented findings that 77% of responding business professionals said that the use of mobile devices in the workplace is important to achieving business goals, but simultaneously, 76% of respondents believe that mobile devices introduce a serious risk [Silv13]. The survey revealed that only 39% of the devices have security controls to mitigate the risk and nearly 59% of respondents admitted to malware infections over the last 12 months of unsecured laptops, smartphones, and tablets. Business organizations, particularly in government, health care and defence face new legal issues, i.e. ownership of devices, private purchase of mobile devices, ownership of the information on the device. There is no clear answer, therefore companies should consider the context in which their employees' devices are used and if the employees' use of the devices for work purposes is very limited and concerns non-critical information, then BYOD strategy can make sense and it adds convenience at a predictable cost. However, the companies have several classes of users and have to choose a different provisioning and cost strategy for each separately.

Research on mobile devices' usage by students

The research is focused on the analysis of students' attitudes towards new media and mobile devices. A short one page questionnaire was distributed among students. The students were asked if they are using the technology for purposes specified in Table 1.

Table 1

Technologies and mobile devices used by students

Technology and Device	Purpose of usage 2013				Purpose of usage 2014			
	learning	working	social relations	no use	learning	working	social relations	no use
Stationary phone	0,02	0,27	0,36	0,44	0,04	0,09	0,22	0,72
Mobile phone	0,31	0,53	0,90	0,08	0,42	0,32	0,76	0,20
Smart phone	0,26	0,24	0,50	0,49	0,64	0,35	0,78	0,21
Ipod	0,03	-	0,03	0,96	0,02	0,01	0,04	0,94
Ipad	0,05	0,03	0,07	0,93	0,06	0,04	0,07	0,91
Notebook	0,67	0,48	0,63	0,29	0,68	0,34	0,64	0,30
Netbook	0,20	0,16	0,21	0,73	0,25	0,09	0,24	0,72
Desktop computer	0,43	0,32	0,44	0,39	0,56	0,28	0,48	0,39
Tablet	0,10	0,05	0,12	0,82	0,14	0,09	0,22	0,73
Gpsdevice	0,01	0,28	0,33	0,46	0,04	0,19	0,20	0,61
RFID device	-	0,05	0,02	0,95	0,01	0,01	0,01	0,98
Automatic personal identification	0,02	0,06	0,01	0,93	0,01	0,06	0,02	0,91
Biometric personal identification	0,02	0,04	0,02	0,93	0,01	0,03	0,02	0,95

Source: Own research.

In 2013, 114 students answered the questionnaire. The survey was repeated in 2014 at the same university, but another similar size group of students was examined. Students accepted the survey as important for the evaluation of their competence to use mobile devices in learning process. The first part of questions in this survey concerns the issue of what devices and technologies are utilized by students. The answers are included in Table 1 and Figure 1.

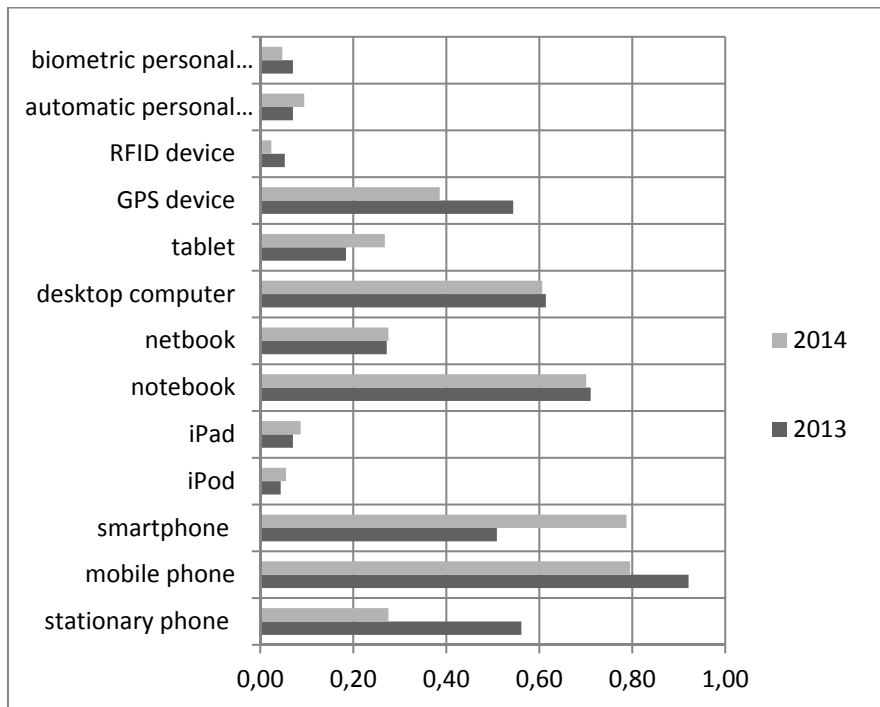


Fig. 1. Percentage of students using the mobile devices

Source: Own research.

In Table 1 structure rates, i.e. number of positive answers to the total number of examined students are placed. Surprisingly, the survey results received in 2013 are very similar to the results received in 2014 (see Figure 1). Taking into account the research results, mobile phones and notebooks are the most popular devices for social relations development as well as for learning and for occupational work.

Young people (e.g. students) reject stationary phones for mobile phones and smart phones. The devices for automatic identification and biometric identification are still not very popular, although new passports are supported by the biometric identification of the owner. Students still use desktop computers for learning, because at university laboratories there are desktop computers available, however they prefer notebooks for learning. In 2013, 54% of surveyed students have answered they use their own mobile devices for occupational works (33% respectively in 2014). In 2013, 89% of the students used owned devices in learning process at university (94% in 2014). Although, private owned mobile devices are sometimes accepted by business employers, business owners provide the employees with com-

panty mobile devices. Therefore, students admitted that for business they did not use their private mobile devices. In 2013, 34% of the students declared that they prefer to access the Internet from only one mobile device (23% in 2014).

In 2013, 76% of the students used different mobile devices for different purposes (75% in 2014). In 2013, 46% of the surveyed students argued that access to Internet from only one device was realized more quickly than access from more than one (36% in 2014). Nearly the same percentage of students believed in 2013 that access to Internet from one device was more efficient (i.e. 48% in 2013 and 37% in 2014) and more secure (55% of students in 2013, 50% in 2014). It is difficult to argue that it is a tendency, but a small increase of the number of individuals interested in the diversification of ICT devices has been noticed. The second part of the survey concerns the popularity of social media, social network portals and communication software among students and use of the technologies for learning support, occupational work support and for social communication, maintaining contacts with friends and families or generally, for social relations development.

Table 2

Communication software and social media usage

Social media & communication software	Purpose of usage 2013				Purpose of usage 2014			
	learning	working	social relations	no use	learning	working	social relations	no use
Email	0,80	0,6	0,85	0,00	0,83	0,61	0,92	0,02
SMS	0,54	0,47	0,88	0,00	0,42	0,34	0,96	0,02
Chat room	0,39	0,26	0,59	0,22	0,42	0,23	0,70	0,28
Skype	0,22	0,07	0,74	0,24	0,31	0,19	0,66	0,21
Facebook	0,42	0,14	0,83	0,14	0,65	0,20	0,91	0,07
YouTube	0,40	0,10	0,64	0,06	0,52	0,09	0,54	0,10
Twitter	0,01	0,01	0,04	0,84	0,01	0,01	0,13	0,91
WAYN	0,00	0,00	0,00	0,89	0,00	0,00	0,00	1,00
LinkedIn	0,00	0,05	0,06	0,80	0,01	0,10	0,02	0,89
Recommender system	0,03	0,02	0,05	0,81	0,01	0,02	0,03	0,95
Price comparison portals	0,10	0,14	0,36	0,34	0,09	0,09	0,26	0,62
Google Maps	0,35	0,39	0,52	0,11	0,18	0,28	0,58	0,25
Wikipedia	0,66	0,23	0,21	0,10	0,90	0,16	0,16	0,04
Discussion fora	0,41	0,17	0,37	0,26	0,59	0,20	0,39	0,27
Blogs	0,13	0,05	0,29	0,52	0,29	0,07	0,30	0,54
Open e-book repositories	0,42	0,10	0,10	0,40	0,49	0,09	0,02	0,54
Open e-publication	0,6	0,16	0,17	0,21	0,39	0,09	0,03	0,60

Source: Own research.

Electronic mailing (i.e. emails) and SMS communication are the most popular communication forms. All of the surveyed students use them. The emailing is called “killer application” and it is treated as the basic communication form between university faculty staff and students.

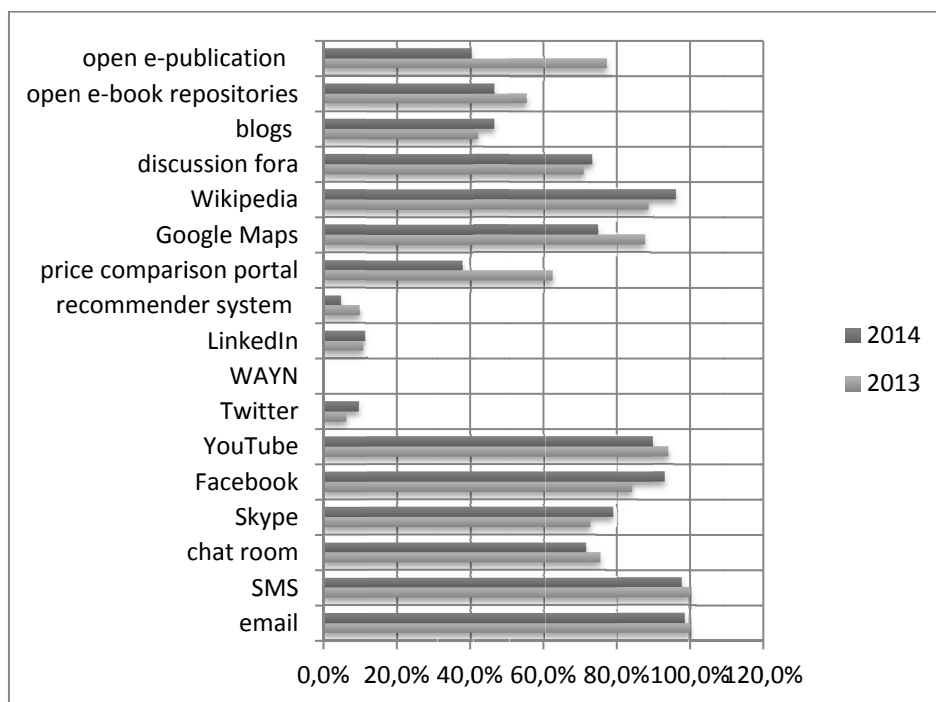


Fig. 2. Percentage of students using the communication software and social media

Source: Own research.

It should be noted that Facebook is also very popular in contrast with LinkedIn and WAYN. Twitter is widely used in other countries, particularly in US and by politicians, by not by students in Poland. Recommender systems are implemented, but they are not widely approved by students. Probably, students used them, but they did not recognize the suggestions to buy similar products on Amazon.com or accept friends of friends on Facebook as recommender systems (Table 2, Figure 2).

In Table 2 structure rates, i.e. number of positive answers to the total number of examined students are placed. It should be noticed that students readily support their educational processes as well as their occupational works by knowledge from open repositories. Access to e-publications is easier, i.e. more comfortable and less effort and time consuming than to printed materials. Gener-

ally, the survey results are very similar to the effects received by Wójcik [Wójc12]. There was also the tendency revealed on reduction of usage of desktop computers and stationary telephones in favour of laptops and mobile devices.

m-Learning

Mobile devices are no longer simple voice communication devices. They have become a medium to create voice, music, text, video and image communications. Soon, at universities the computer laboratories will not need to be supported by desktop computers, instead there is an opportunity to use private mobile devices to connect via the Internet to servers and utilize business applications. However, wide implementation of mobile education is still a challenge. Some of the problems are mobile service costs, the need to change attitudes and institutions' policy against using electronic devices [VeSh12]. Development of mobile learning is driven by an opportunity, necessity, innovativeness and perceived weaknesses of e-learning. Nowadays, private enterprises and government sponsored programs and educational institutions are in a key position to find new ways to emphasize the role of m-learning and focus on user experience for further m-learning system development. M-learning means also the change of learning process paradigm. M-learning is not simply a direct extension of e-learning. What may work perfectly well in traditional education or even in an e-learning system, may not fit the dynamic mobile environment. M-learning seems to support individual learning in the special context. Glossaries, dictionaries, phrasebooks, learning tips, examples, games and other learning aids are important in m-learning. M-learners within a community share ideas, stories, opinions or ratings, and utilize the student-to-student and student-to-teacher interactions. Mobile devices allow for the realization of education process in a particular socio-natural context, where teachers are able to explain more precisely the course topics during field works. For instance, students can learn biology in the forest and verify the acquired knowledge online through mobile devices. M-grading and m-testing are also possible with mobile phones. For example, during a course in a big university hall concrete questions are randomly sent to particular, chosen students who are obliged to answer within a few seconds. Teachers can provide feedback via SMS or other means regarding homework assignments or test scores to a group of students. However, it can be stressful for teachers, who are obliged to answer students anytime and anywhere. In some cases, mobile learning is seen as an adjunct to more traditional learning or e-learning. For example, students call together for group projects or enter-

tainment events. The use of the small screen of mobile device for animations, graphs, equations perhaps is trendy, and the graphical user interface (GUI) makes course materials more appealing to students. There are some considerations for defining m-learning systems compared to the traditional e-learning system. Some important issues are as follows: 1) understanding which mobile system model is to be used, 2) controlling the access to student data on mobile devices, and 3) the profile of students.

Mobile applications are now accessible for diverse training such as: test preparation, skill based learning like languages and mathematics and a multitude of other educational topics [VeSh12]. The use of the mobile device for collaborative efforts is gaining momentum, ranging from mobile blogging capabilities to collaborative games using mobile phones. Students report that advantages for having education on the mobile include the connectivity to the educational setting at all times, and natural language usage as well as natural usage of a familiar object, informality and friendliness of the interaction, engaging and more playful learning activities, convenient for their needs and customized to their personalities and learning behaviours. Students responded that the following qualities of the mobile were the most advantageous: availability, flexibility, portability, low cost, ease of checking as often as they want, and the sense of being in control. Barriers to adoption of mobile technology into classroom practices include the lack of the space on screen for the adequate preparation of lesson plans specific to the mobile, and limitation of the mobile itself for educational processes (e.g. small screen, difficulty in typing input). Many problems are concerned with improper use of the mobile during class time (e.g. cheating during exams, copying instead of understanding). Teachers may vary in their ability to control and monitor judicious, wholesome and moral mobile behaviours among the student population.

Conclusions and future work

The paper was prepared to show the university students' attitudes towards mobile devices and new media. Students as consumers of mobile devices have been found to rely on market information when evaluating innovations. Relatively high price is the main reason of the low usage of iPods and iPads. Students still cannot afford these very expensive gadgets. Beyond that, students do not recognize application of RFID and biometric identification in their life, although biometric passwords are now widely implemented. Students are rather conservative and need time for the verification of usefulness of Twitter, blogs and recommender systems. Usability of some new media is bigger for private

social communication than for business, as it is in the case of Skype, Facebook, Google Maps and YouTube. Further research could cover analysis of virtual environment, i.e. private or public clouds which provides an access to applications that learners want and the environment that can be used regardless of place and time.

References

- [Alag06] Alag H.S.: Business Process Mobility. In: Handbook of Research in Mobile Business: Technical, Methodological, and Social Perspectives, Vol. 1. B. Unhelkar (ed.). Idea Group Reference, Hershey, pp. 583-601.
- [ChZh14] Chin A., Zhang D.: Mobile Social Networking. An Innovative Approach. Springer, New York 2014.
- [KeKa12] Kelson N., Kalwerisky J.: Bring Your Own Device (BYOD). In: Security Audit/Assurance Program. ISACA, 2012, <http://www.isaca.org/BYOD-AP>, retrieved May 2013.
- [Silv13] Silva P.: BYOD 2.0: Moving Beyond MDM. March 8, 2012, <http://www.f5.com>, retrieved May 2013.
- [VeSh12] Velokovsky A., Shammass S.: Mobile Education. In: Mobile Technology Consumption Opportunities and Challenges. B.L. Ciaramitaro (ed.). Information Science Reference, Hershey 2012, pp. 16-32.
- [Wójc12] Wojcik J.: Attitudes of Polish Students towards Web 2.0 Technology. In: Creativity Support Systems, Methods and Applications. H. Sroka, S. Stanek, M. Pankowska (eds.). University of Economics, Katowice 2012, pp. 119-131.
- [YuZh14] Yu Z., Zhou X.: Socially Aware Computing: Concepts, Technologies and Practices. In: A. Chin, D. Zhang (eds.): Mobile Social Networking: An Innovative Approach. Springer, New York 2014, pp. 9-25.
- [ZYGW14] Zhang D., Yu Z., Guo B., Wang Z.: Exploiting Personal and Community Context in Mobile Social Networks. In: A. Chin, D. Zhang (eds.): Mobile Social Networking: An Innovative Approach. Springer, New York 2014, pp.109-139.

REZULTATY BADANIA TECHNOLOGII KOMUNIKACJI SPOŁECZNEJ

Streszczenie

Celem badania jest przedstawienie preferencji studentów Uniwersytetu Ekonomicznego dla użycia urządzeń mobilnych i nowych mediów społecznościowych. Artykuł obejmuje analizę i dyskusję na temat wyników badań preferencji studentów. Badanie zostało wykonane w 2013 r. i powtórzone w 2014 r. na Uniwersytecie Ekonomicznym w Katowicach. Wyniki badania wydają się być użyteczne dla dalszej oceny bezpieczeństwa, dostępności i skalowalności zastosowań nowych mediów na uniwersytecie.