# EXPERIENCE OF THE FOURTH-YEAR UNDERGRADUATES IN USING INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT)

**Vincentas Lamanauskas, Violeta Šlekienė, Loreta Ragulienė**
University of Šiauliai, Lithuania
E-mail: v.lamanauskas@ef.su.lt, violeta@fm.su.lt, fk@fm.su.lt

## Abstract

*It is accepted that ICT makes the process of teaching/learning more effective and beneficial whereas the education system starts functioning faster. The development of ICT and the process of globalization determine alteration in the education system as well as in the whole society. The implementation of new technologies in the educational process raises new possibilities for both teacher and learner, enhances education quality and makes the educational process more versatile.*

*A crucial point is that employing ICT must be highly efficient in the process of training would-be teachers of sciences. The students graduated from comprehensive or upper secondary (gymnasium) schools have a broad knowledge of mastering ICT the major part of which are PCs, palmtop computers, mobile phones, different kinds of audio, video and digital players etc. In this case, we encounter a problem of how to properly develop the acquired abilities in the further process of studying.*

*Thus, **the object of our research** is the ability of the fourth-year undergraduates to use information and communication technologies. **The aim of research** is to gain information concerning the fourth-year students' opinion on the application of ICT in the process of studies. The research A Student and Information and Communication Technologies was conducted in January – March, 2010. Research sample consisted of 322 respondents who were 4th year university students. To analyze research data, the measures of descriptive statistics (absolute and relative frequencies, popularity/usefulness/necessity indexes) have been applied.*

*The surveyed fourth-year undergraduates have almost unlimited possibilities of using a computer, mobile phone, the Internet and an electronic data storage device - USB flash drive. The students almost daily use the basic functions of the mobile phone (writing SMS, calling). However, calling to other people using a mobile phone and sending SMS are a more frequent occupation of females as male students are tend to search for information on the Internet and send and receive e-mails. Considering all aspects of using information and communication technologies among the surveyed fourth-year students that graduated from city or regional schools, no statistically significant deviation has been noticed.*

**Key words:** *fourth-year undergraduates, experience, process of teaching/learning, process of studies survey.*

## Introduction

Recently, an increasing interest in employing computer-based technologies at the international level in the teaching/learning process can be clearly noticed. Different areas of life have been researched to validate the efficiency of the applied technologies and an impact on the potential for improved learning, the effectiveness of studies etc. (Nelson Laird, Kuh, 2005; Yukiko Inoue, 2007; Frankowicz, 2008; Turčani, Kapusta, 2008). The conducted researches involve different parameters regarding the sex, age, ethnic dependence etc. Yukiko Inoue (2007) notices that the students maintain a positive attitude towards the use of computer-based technologies. Those annually entering universities have better abilities to use ICT. An extremely important point is how the latter capacities can be applied and developed in the process of studies. ICT are evidently employed in all fields of studying. On the one hand, the rapid development of ICT is taking place, whereas on the other – educational technologies are also significantly changing, particularly in the sector of comprehensive school. Thus, the establishments of higher education must seriously consider and evaluate this situation. A.Glosienė (2006) accepts that developing information competence of an academic society remains a burning issue. An assessment of the opinions of the first-year undergraduates concerning the use of computer-based technologies when studying sciences in comprehensive school has revealed that most frequently, the learners independently succeed in using a computer while a smaller part – is provided assistance by friends, family members or other people. It has also been found out that computer-based technologies are very rarely employed in the classroom during science lessons. The teachers relatively more often used computer when teaching physics and biology and not that regularly – during the chemistry and geography lessons. The teachers of all sciences extremely rarely used computer-based technologies outside the classroom, i.e. during tutorial services, giving advice, providing different tasks (Lamanauskas, Šlekienė, Ragulienė, 2009). The followed research on the positions of the first-year undergraduates has disclosed that practically, they have endless possibilities of using a mobile phone, computer, mini electronic data storage device - USB flash drive and the Internet. The students have found a computer an everyday necessity measure intensively used in both cases – for studying and spending free time. The students use the basic functions of a mobile phone (SMS, speaking on the phone) almost every day. A computer is the most required sort of ICT for the first-year undergraduates. In the majority of cases, it serves as a tool for studies in general, preparing documents, presenting works etc. (Lamanauskas, Šlekienė, Ragulienė, 2010). The findings reported by A. Mickus and A. Vidžiūnas (2009) reveal that the quality of knowledge about computer literacy of those entering Vytautas Magnus University is very limited. The scientists have also established that approximately 25% of the students are experienced enough in using computer-based technologies; however, the majority of those feel a shortage of information (Mickus, Vidžiūnas, 2009). Since 2006, Klaipeda College of Social Sciences have conducted a survey of more than 1000 students from different colleges around Lithuania. The obtained information has disclosed that the Internet is the main electronic resource used by both full-time and extramural students. In general, the students are sufficiently familiar with information technologies and possibilities of applying them in practice so that to easily employ these tools in the process of studies (Student surveys ... 2010).

However, from a political point of view, serious problems can be encountered. Following the enlargement of the EU in 2004, differences in the level of using ICT between the old and new Member States of the EU have occurred. It is supposed that these differences first of all were determined by the low cost of living of the new Member States. Regardless of how nice various political strategies and declarations of Governments should sound an economic capacity of a country remains a crucial factor. Within the period of competitive and global economy, training would-be specialists should keep up with the current trends and generally accepted

standards. Another important aspect is persistent low teacher motivation for using ICT in the process of studies, particularly in the fields of social sciences and humanities.

Thus, **the object of our research** is the ability of the fourth-year undergraduates to use information and communication technologies. **The aim of research** is to gain information concerning the fourth-year students' opinion on the application of ICT in the process of studies.

## Research Methodology

### General Characteristics of Research

Research *A Student and Information and Communication Technologies* was carried out in January - March 2010. In order to know preliminary results, pilot research under the title *A Student and Computer-Based Technologies* was conducted in October - November 2009 (Lamanauskas, Šlekienė, Ragulienė, 2009, 2010). The method of research is surveying (filling in a questionnaire). The undertaken research mainly agrees with Lithuanian context as the survey involved the respondents who had graduated from different comprehensive schools (concerning type and localization) and represented three Lithuanian universities, including Siauliai University, Vilnius Pedagogical University and Kaunas Medical University.

### Instrument of Research

For data collection, an anonymous questionnaire compiled from 4 basic blocks (see Appendix) was distributed. The applied questionnaire was prepared by Australian researches (Kennedy, Judd, Churchward, Gray, Kerri-Lee Krause, 2008). The questionnaire contains four main sections such as demographic information (5 parameters), abilities to use computer-based technologies and the Internet (13 parameters), the use of technologies (computer-based – 11 parameters, the Internet – 18 parameters and mobile phone – 8 parameters) and the need of ICT in the process of studies (19 parameters). The above introduced instrument was partly modified taking into consideration the specificity of studies in Lithuanian universities.

### Sample

322 fourth-year undergraduates of bachelor studies participated in the survey. The distribution of the respondents regarding the sex and place of the graduated school is presented in Table 1.

**Table 1.    Characteristics of the respondents (N/%).**

| Sex | Female | Male | Total |
|---|---|---|---|
|  | 218/67.7 | 104/32.3 | 322/100 |
| Place of the graduated school | City | Regional | Total |
|  | 136/42.2 | 186/57.8 | 322/100 |

### Statistical Procedure

To assess the obtained data, the indexes of descriptive statistics (absolute and relative frequencies, possibility indexes, standard deviations) were employed. To establish differences between variables, parametrical student criterion t was applied. The instrument of data processing is SSPS statistical software package.

## Research Results

The respondents were asked about the possibilities of using a mobile phone, computer, cameras, USB flash drive, the Internet and other kinds of information and communication technologies (Table 2) as well as about the necessity to use such equipment for the purposes of studies at university.

**Table 2.** **Students' possibilities of using computer-based technologies (N/%) (PI – possibility index, $0 \leq PI \leq 1$).**

| Possibilities of using information and computer-based technologies and the Internet | | Unlimited | Limited | No access | PI |
|---|---|---|---|---|---|
| Mobile phone | | 292/90.7 | 25/7.8 | 5/1.6 | **0.95** |
| Desktop computer | | 220/68.3 | 69/21.4 | 33/10.2 | **0.79** |
| Laptop computer | | 220/68.3 | 58/18.8 | 44/13.7 | **0.77** |
| Palmtop computer | | 23/7.1 | 46/14.3 | 253/78.6 | **0.14** |
| Digital camera | | 227/70.5 | 62/19.3 | 33/10.2 | **0.80** |
| Digital video camera | | 97/30.1 | 60/18.6 | 165/51.2 | **0.39** |
| USB flash drive | | 294/91.3 | 17/5.3 | 11/3.4 | **0.94** |
| MP3 player | | 188/58.4 | 50/15.5 | 84/26.1 | **0.66** |
| iPod touch | | 36/11.2 | 42/13.0 | 244/75.8 | **0.18** |
| GPS navigator | | 38/11.8 | 59/18.3 | 225/69.9 | **0.21** |
| Portable library (eBook Reader) | | 15/4.7 | 38/11.8 | 269/83.5 | **0.11** |
| Game console | | 42/13.0 | 50/15.5 | 230/71.4 | **0.21** |
| Internet 1. 2. | Broadband | 174/54.0 | 41/12.7 | 107/33.2 | **0.60** |
| | Dialup | 116/36.0 | 62/19.3 | 144/44.7 | **0.46** |
| | Wireless | 114/35.4 | 56/17.4 | 152/47.2 | **0.44** |

96.6% of the respondents have unlimited possibilities of using a computer: desktop, laptop or palmtop. The strongest possibility can be noticed among the students using a desktop computer (possibility index PI = 0.79, standard deviation SD = 0.34), whereas the most limited one – among those using the palmtop one (PI = 0.14, SD = 0.29). This is one of the most advanced technologies not that widely used by our young respondents. In terms of the sex, statistically significant deviation can be observed between the male and female students' possibilities of using a palmtop computer: more possibilities have male (PI = 0.23) than female (PI = 0.10) students. Zero hypothesis on the equality of averages is rejected at the level of significance and makes $p < 0.0001$; df = 320; t = -3.56. The students having unlimited possibilities of using a computer widely apply the most accepted tool – USB flash drive that is an electronic data storage device (PI = 0.94, SD = 0.21) which seems to be an integral instrument for keeping in touch among separate users. 292/90.7% of the questioned respondents have unlimited possibilities of using a mobile phone (PI = 0.95, SD = 0.18). Only 5/1.6% of the respondents have no access to the mobile phone. A digital camera is also a rather widely used tool (PI = 0.80, SD = 0.33), whereas a digital video camera is not that popular among the students (PI = 0.39, SD = 0.44) the unlimited possibilities of using which have 97/30.1% of the respondents while a half of those (165/51.2%) have no access. Presently, a GPS navigator (PI = 0.21, SD = 0.35) and game console (PI = 0.21, SD = 0.36) are not so popular. Little used is iPod touch (PI = 0.18, SD = 0.34) and very little – a portable library (eBook Reader) (PI = 0.11, SD = 0.26). These digital

technologies are relatively new, pretty expensive and not directly connected with the process of studying, and therefore can be attributed to luxury or specific preference having goods. The obtained statistically significant deviation indicated that male rather than female students more frequently applied a GPS navigator, iPod touch, eBook Reader and game console (Table 3).

**Table 3.    Statistical analysis in terms of the sex.**

| Possibilities of use | Sex | PI | SD | p | t | df |
|---|---|---|---|---|---|---|
| GPS navigator | Male,  N = 104 | **0.35** | 0.42 | | 5.06 | |
| | Female, N = 218 | **0.14** | 0.29 | | | |
| iPod touch | Male,  N = 104 | **0.28** | 0.39 | | 4.02 | |
| | Female, N = 218 | **0.13** | 0.29 | | | |
| eBook Reader | Male,  N = 104 | **0.19** | 0.32 | < 0.0001 | 4.33 | 320 |
| | Female, N = 218 | **0.06** | 0.20 | | | |
| Games console | Male,  N = 104 | **0.39** | 0.42 | | 6.75 | |
| | Female, N = 218 | **0.12** | 0.28 | | | |

Statistically significant is information that male (PI = 0.75, SD = 0.39) rather than female (PI = 0.62, SD = 0.44) students more frequently use MP3 players. Zero hypothesis on the equality of averages is rejected at the level of significance and makes p < 0.001; df = 320; t = -2.43. 303/94.1% of the respondents have unlimited access to the Internet and only 19.5% of those have a limited possibility of using it. More possibilities have the ones using the Broadband (cable) Internet (PI = 0.60, SD = 0.46) in comparison with dialup (modem) (PI = 0.46, SD = 0.45) and wireless (PI = 0.44, SD = 0.45).

The questionnaire included 11 questions to find out how frequently and for what purposes the students used a computer (Table 4).

**Table 4.    Students' opinion on the purposes of using a computer (N/%) (AI – application index, 0 ≤ AI ≤ 1).**

| How frequently do you use a computer for the following purposes? | Daily | Once a week | Once a month | Less than once a month | No use | AI |
|---|---|---|---|---|---|---|
| Use a computer for writing documents (e.g. using *Word*) | 164/50.9 | 96/29.8 | 25/7.8 | 33/10.2 | 4/1.2 | **0.80** |
| Use a computer for data processing (tables, figures etc.) | 72/22.4 | 123/38.2 | 70/21.7 | 52/16.1 | 5/1.6 | **0.66** |
| Use a computer for creating graphics or manipulating digital images (e.g. using *Photoshop, Flash*) | 75/23.3 | 133/41.3 | 56/17.4 | 42/13.0 | 16/5.0 | **0.66** |
| Use a computer for creating web pages (e.g. using *Dreamweaver, Frontpage*) | 15/4.7 | 25/7.8 | 27/8.4 | 40/12.4 | 215/66.8 | **0.18** |
| Use a computer for creating multimedia presentations | 26/8.1 | 94/29.2 | 139/43.2 | 53/16.5 | 10/3.1 | **0.56** |
| Use a computer for editing audio and video images (e.g. *iMovie*) | 21/6.5 | 41/12.7 | 58/18.0 | 66/20.5 | 136/42.2 | **0.30** |

Vincentas LAMANAUSKAS, Violeta ŠLEKIENĖ, Loreta RAGULIENĖ. Experience of the Fourth-Year Undergraduates in
Using Information and Communication Technologies (ICT)

PROBLEMS
OF EDUCATION
IN THE 21ˢᵗ CENTURY
Volume 23, 2010

129

| | | | | | | |
|---|---|---|---|---|---|---|
| Use a computer for general study with no access to the web | 138/42.9 | 76/23.6 | 39/12.1 | 36/11.2 | 33/10.2 | **0.70** |
| Use a computer for playing digital music files (e.g. *iTunes*) with no access to the Internet | 201/62.4 | 54/16.8 | 23/7.1 | 29/9.0 | 15/4.7 | **0.81** |
| Use a computer for playing games with no access to the Internet / web | 53/16.5 | 56/17.4 | 49/15.2 | 39/12.1 | 125/38.8 | **0.40** |
| Use a game console for playing games | 18/5.6 | 28/8.7 | 23/7.1 | 35/10.8 | 218/67.7 | **0.18** |
| Use a handheld computer (e.g. a PDA) as a personal organiser (e.g. diary, address book) | 26/8.1 | 39/12.1 | 25/7.8 | 34/10.6 | 198/61.5 | **0.24** |

The students most frequently use a computer every day for *listening to music with no access to the Internet* (AI = 0, 81, SD = 0, 23) and *preparing / writing documents* (AI = 0, 80, SD = 0, 21). Almost a half of the fourth-year undergraduates find a computer as the one necessary for *general study with no access to the Internet* (AI = 0,70, SD = 0,29). 133/41.3% of the respondents use a computer once a week for *editing audio and video images* and 123/38.2% apply for *data processing (tables, figures etc.)*. It seems to be that a computer has become a measure of daily necessity as it is intensively used not only for studying purposes but also for leisure activities. Only a minor part of the fourth-year undergraduates *create web pages* and (AI = 0, 18, SD = 0, 34) *play games employing a game console* (AI = 0, 18, SD = 0, 36). No statistically significant deviation between the users graduated from city and regional schools concerning the possibilities of applying a computer has been noticed. However, regarding the sex, one can observe a different situation showing that male (AI = 0.35, SD = 0.35) rather than female (AI = 0.09, SD = 0.22 when $p < 0.0001$; df = 320; t = - 7.92) students are more involved in *creating web sites* and *data processing (tables, figures etc.)* (AI = 0.73, SD = 0.23) and (AI = 0.62, SD = 0.27) respectively when $p < 0.001$; df = 320; t = - 3.45. It could be maintained that male rather than female students apply more complex functions provided by the computer.

An indispensable part of contemporary life is a mobile phone, and therefore we wanted to know about the purposes the students had while using a mobile phone. The obtained data is provided in Table 5.

**Table 5. Students' opinion on the purposes of using a mobile phone (N/%) (AI – application index, 0 ≤ AI ≤ 1).**

| How frequently do you use a mobile phone for the following purposes? | Daily | Once a week | Once a month | Less than once a month | No use | AI |
|---|---|---|---|---|---|---|
| Use a mobile phone for calling people | 266/82.6 | 38/11.8 | 6/1.9 | 11/3.4 | 1/0.3 | **0.93** |
| Use a mobile phone for writing a text/ SMS | 282/87.6 | 29/9.0 | 4/1.2 | 6/1.9 | 1/0.3 | **0.95** |
| Use a mobile phone for taking digital photos or movies | 32/9.9 | 88/27.3 | 87/27.0 | 69/21.4 | 46/14.3 | **0.49** |
| Use a mobile phone for sending pictures or movies to other people | 30/9.3 | 54/16.8 | 54/16.8 | 51/15.8 | 133/41.3 | **0.34** |

| | | | | | | |
|---|---|---|---|---|---|---|
| Use a mobile phone as a personal organiser (e.g. diary, address book) | 44/13.7 | 46/14.3 | 37/11.5 | 46/14.3 | 149/46.3 | **0.34** |
| Use a mobile phone for listening to music, radio | 73/22.7 | 59/18.3 | 50/15.5 | 50/15.5 | 90/28.0 | **0.48** |
| Use a mobile phone for accessing information/ services on the web | 47/14.6 | 38/11.8 | 46/14.3 | 43/13.4 | 148/46.0 | **0.34** |
| Use a mobile phone for sending / receiving e-mails | 37/11.5 | 22/6.8 | 19/5.9 | 25/7.8 | 219/68.0 | **0.22** |

The students use basic mobile phone functions almost every day: *send SMS / MMS* (AI = 0.95, SD = 0.12) and *make calls for other people* (AI = 0.93, SD = 0.15). A rare function of a mobile phone used by the respondents is *sending or receiving an e-mail* (AI = 0.22, SD = 0.33). Almost a half of the students (149/46.3%) *do not use a mobile phone as a personal organiser* and 148/46.0% of those – for *searching on the Internet*. In view of the sex of the respondents and considering the possibility of using a mobile phone, a statistically significant deviation has been established, however, no deviations have been found taking into account the students graduated from city or regional schools. Female students are tend to use a mobile phone more frequently than males which makes (AI = 0.95, SD = 0.16) and (AI = 0.90, SD = 0.19) respectively. Zero hypothesis on the equality of averages is rejected at the level of significance and makes $p < 0.002$; df = 320; t = 2.06. Also, they more often send SMS and MMS which is AI = 0.97, SD = 0.12 and AI = 0.92, SD = 0.18 respectively when $p < 0.003$; df = 320; t = 2.95. Nevertheless, special functions of a mobile phone are more common for male rather than female students: they *surf the Internet* AI = 0.44, SD = 0.37 and AI = 0.29, SD = 0.37 respectively when $p < 0.002$; df = 320; t = -3.19 as well as *send and receive e-mails* AI = 0.29, SD = 0.37 and AI = 0.18, SD = 0.34 accordingly when $p < 0.006$; df = 320; t = -2.75.

The surveyed respondents were asked about the frequency and purposes they used the Internet (Table 6).

**Table 6. Students' opinion on the purposes of using the Internet (N/%) (AI – application index, $0 \leq AI \leq 1$).**

| How frequently do you use the Internet for the following purposes? | Daily | Once a week | Once a month | Less than once a month | No use | AI |
|---|---|---|---|---|---|---|
| Use the web for accessing school or university portal | 92/28.6 | 121/37.6 | 48/14.9 | 55/17.1 | 6/1.9 | **0.68** |
| Use the web for looking up reference information for study purposes (e.g. online dictionaries) | 183/56.8 | 91/28.3 | 20/6.2 | 23/7.1 | 5/1.6 | **0.83** |
| Use the web for browsing for general information (e.g. news, holidaying, event timetables) | 246/76.4 | 54/16.8 | 10/3.1 | 12/3.7 | 0/0 | **0.91** |
| Use the Internet/web or LAN for playing networked games | 65/20.2 | 70/21.7 | 52/16.1 | 43/13.4 | 92/28.6 | **0.48** |
| Use the web for listening to sound recordings (e.g. via streaming audio or *iTunes*) | 158/49.1 | 67/20.8 | 44/13.7 | 30/9.3 | 23/7.1 | **0.74** |

| | | | | | |
|---|---|---|---|---|---|
| Use the web for other pastimes (i.e. for leisure activities, movies) | 64/19.9 | 100/31.1 | 68/21.1 | 43/13.4 | 47/14.6 | **0.57** |
| Use the web for buying / selling different stuff (e.g. *eBay, Amazon*, air tickets) | 12/3.7 | 40/12.4 | 47/14.6 | 60/18.6 | 163/50.6 | **0.25** |
| Use the web for other services (e.g. banking, paying bills) | 19/5.9 | 72/22.4 | 111/34.5 | 55/17.1 | 65/20.2 | **0.44** |
| Use the web for sending / receiving e-mails (e.g. *Hotmail, Yahoo, Outlook*) | 236/73.3 | 44/13.7 | 16/5.0 | 21/6.5 | 5/1.6 | **0.88** |
| Use the web for instant messaging / chatting (e.g. *MSN, Yahoo, ICQ*) | 266/82.6 | 26/8.1 | 9/2.8 | 18/5.6 | 3/0.9 | **0.91** |
| Use the web for building /maintaining a web site | 11/3.4 | 14/4.3 | 26/8.1 | 40/12.4 | 231/71.7 | **0.14** |
| Use the web for downloading MP3 files (e.g. music, videos, podcasts) | 127/39.4 | 99/30.7 | 49/15.2 | 38/11.8 | 9/2.8 | **0.73** |
| Use the web for downloading software | 60/18.6 | 83/25.8 | 91/28.3 | 45/14.0 | 43/13.4 | **0.56** |
| Use the web for sharing photographs or other digital material (e.g. using *Blinklist, Flickr*) | 66/20.5 | 85/26.4 | 89/27.6 | 56/17.4 | 26/8.1 | **0.58** |
| Use the web for making phone calls (e.g. VoIP using *Skype*) | 58/18.0 | 79/24.5 | 41/12.7 | 46/14.3 | 98/30.4 | **0.46** |
| Use the web for web conferencing (e.g. using a webcam) | 23/7.1 | 69/21.4 | 51/15.8 | 50/15.5 | 129/40.1 | **0.35** |
| Use the web for reading RSS feeds (e.g. news feeds) | 36/11.2 | 42/13.0 | 38/11.8 | 38/11.8 | 168/52.2 | **0.30** |
| Use social networking software on the web (e.g. *MySpace, Trendster*) | 86/26.7 | 61/18.9 | 42/13.0 | 48/14.9 | 85/26.4 | **0.51** |

The students most frequently use the Internet for *communication purposes* (AI = 0.91, SD = 0.19), *browse for general information* (AI = 0.91, SD = 0.18), *send / receive e-mails* (AI = 0.88, SD = 0.23) and for *studying purposes* (AI = 0.83, SD = 0, 24). The Internet is most rarely used for *building / maintaining web sites* (AI = 0.14, SD = 0.32) and *buying / selling stuff* (AI = 0.25, SD = 0.31). Almost a half of the respondents (158/49.1%) *listen to music on the Internet every day* and only 36/11.2% of those – *use the web for RSS feeds*. Nearly a similar part of the surveyed participants (86/26.7%) either daily participate in the social web sites or do not use them at all. Quite a few statistically significant deviations have been noticed while analyzing the use of the Internet in terms of the sex of the respondents. Statistical assessment has disclosed that male rather than female students more frequently use the Internet for the following purposes: *downloading the required software* (male AI = 0.66, SD = 0.29, female AI = 0.50, SD = 0.32 when p < 0.0001, df = 320, t = -4.29), w*atching films* (male AI = 0.66, SD = 0.32,

female AI = 0.53, SD = 0.33 when p < 0.001, df = 320, t = -3.35), *playing games* (male AI = 0.60, SD = 0.34, female AI = 0.42, SD = 0.38 when p < 0.0001, df = 320, t = -3.99), *buying / selling different stuff* (male AI = 0.35, SD = 0.30, female AI = 0.20, SD = 0.29 when p < 0.0001, df = 320, t = -4.31). If females are tend to use a mobile phone more often for *calling their colleagues*, *making calls on the Internet* is a more frequent occupation of male students (male AI = 0.58, SD = 0.36; female AI = 0.41, SD = 0.38). Zero hypothesis on the equality of averages is rejected at the level of significance and makes p < 0.0001; df = 320; t = -3.86. However, females rather than males more often use the Internet for *communication purposes* (AI = 0.94, SD = 0.19 and AI = 0.87, SD = 0.26 respectively when p < 0.010; df = 320; t = 2.59). No statistically significant deviation between the fourth-year students graduated from city or regional schools in terms of using the Internet has been noticed.

The question about required information and communication technologies while studying at university was included in the applied questionnaire (Table 7).

**Table 7.** **Students' opinion on the need of information and communication technologies for studying purposes (N/%) (AI – application index, 0 ≤ AI ≤ 1).**

| Information and communication technologies required for studying purposes | Yes | Neutral | No | AI |
|---|---|---|---|---|
| A computer for general study | 297/92.2 | 23/7.1 | 2/0.6 | **0.96** |
| A computer to create documents (e.g. using *Word, Excel,* PDFs) | 277/86.0 | 39/12.1 | 6/1.9 | **0.92** |
| A computer to create web pages (e.g. using *Dreamweaver, Frontpage*) | 67/20.8 | 75/23.3 | 180/55.9 | **0.32** |
| A computer to create multimedia presentations (e.g. *PowerPoint, Director*) | 263/81.7 | 50/15.5 | 9/2.8 | **0.89** |
| A handheld computer (e.g. a PDA) as a personal organiser (e.g. diary, address book) | 31/9.6 | 57/17.7 | 234/72.7 | **0.18** |
| The web to access a learning portal (e.g. a 'Course' or 'Learning Management System') | 223/69.3 | 78/24.2 | 21/6.5 | **0.81** |
| The web to look up or search for information (e.g. online dictionaries, *Google*) | 302/93.8 | 15/4.7 | 5/1.6 | **0.96** |
| The web for other services (e.g. enrolment, sign up for tutes, paying fees) | 176/54.7 | 83/25.8 | 63/19.6 | **0.68** |
| The web for instant messaging / chatting (e.g. *MSN, Yahoo, ICQ*) | 244/75.8 | 57/17.7 | 21/6.5 | **0.85** |
| The web to build / maintain a web site | 57/17.7 | 62/19.3 | 203/63.0 | **0.27** |
| Social networking software on the web (e.g. *MySpace, Trendster*) | 133/41.3 | 110/34.2 | 79/24.5 | **0.58** |
| The web to download MP3 files (e.g. podcasts, *iTunes*) | 252/78.3 | 56/17.4 | 14/4.3 | **0.87** |
| The web to download software | 223/69.3 | 68/21.1 | 31/9.6 | **0.80** |
| The web for web conferencing (e.g. using a webcam) | 87/27.0 | 127/39.5 | 108/33.5 | **0.47** |
| The web to read RSS feeds (e.g. news feeds) | 70/21.7 | 98/30.5 | 154/47.8 | **0.37** |
| A mobile phone to send / receive text messages/ SMSs | 223/69.3 | 48/14.9 | 51/15.8 | **0.77** |
| A mobile phone to send / receive e-mails | 83/25.8 | 83/25.8 | 156/48.4 | **0.39** |
| A mobile phone as a personal organiser (e.g. diary, address book) | 79/24.5 | 95/29.5 | 148/46.0 | **0.39** |
| A mobile phone to access web based information / services | 75/23.3 | 94/29.2 | 153/47.5 | **0.38** |

The most required types of information and communication technologies for the fourth-year undergraduates of university is *a computer for general study* (AI = 0.96, SD = 0.14) and the *Internet to search for information* (AI = 0.96, SD = 0.13). The next position takes *a computer necessary for creating documents* (AI = 0.92, SD = 0.12), *multimedia presentations* (AI = 0.89, SD = 0.12) and *accessing a learning portal* (AI = 0.81, SD = 0.14). The Internet is also required for *instant messaging / chatting* (AI = 0.85, SD = 0.15), *downloading different sorts of files (documents, music, video)* (AI = 0.87, SD = 0.16), *downloading the required software* (AI = 0.80, SD = 0.17). *A social web site on the Internet* (AI = 0.58, SD = 0.27) and *the Internet for e-banking purposes* (AI = 0.68, SD = 0.29) are slightly less necessary. Almost a half of the respondents do not need *a mobile phone for web conferencing* (153/47.5%), *a mobile phone to send / receive e-mails* (156/48.4%) and *a mobile phone as a personal organiser* (148/46.0%). As in general the majority of the respondents are not that interested in creating web sites, they find *a computer to create web pages* (AI = 0.32, SD = 0.13) and *the web to build / maintain a website* (AI = 0.27, SD = 0.33) unnecessary. Such results have been expected as a major part of the students are studying social sciences. Regarding the sex of the respondents, male students find some aspects of information and communication tools more beneficial: *the web to download the required software* (male AI = 0.89, SD = 0.25, female AI = 0.76, SD = 0.35 when $p < 0.001$; df = 320; t = -3.26), *a mobile phone to access web-based information / services* (male AI = 0.51, SD = 0.39, female AI = 0.32, SD = 0.40 when $p < 0.0001$; df = 320; t = -4.11), *a computer to create web pages* ( male AI = 0.53, SD = 0.44, female AI = 0.23, SD = 0.34 when $p < 0.0001$; df = 320; t = -6.72), *the web to build / maintain a web site* (male AI = 0.46, SD = 0.44, female AI = 0.19, SD = 0.33 when $p < 0.0001$; df = 320; t = -6.18). No statistically significant deviation between the students graduated from city or regional schools in terms of the need of communication technologies has been noticed.

## Discussion

Research on the use of ICT in the process of studies seems to be not an easy subject matter. First, different technologies rapidly vary. Comparative analysis, for example the one between the first and fourth-year undergraduates in order to find out certain dynamics of applying ICT for studying purposes, is even a more complex procedure. Technologies change every year. Such instruments as iPhones, netbooks etc. are very recent items. Today`s freshmen have mobile phones that hold more songs than that 4-GB nano, and they can use them for different purposes (Smith, Salaway, Borreson Caruso, 2009). Our research has also disclosed that the students mainly use different information and communication technologies despite relatively new and expensive ones such as iPod touch. Investigations carried out by the foreign authors show that using ICT in the process of studying depends on the methodology prevailing in the process of studies. For example, research conducted by Turkish colleagues has disclosed that the respondents who had a largely-student centred teaching methodology had more positive attitudes toward personal computer use, and the respondents who had a more student-centred than teacher-directed teaching approach reported a higher level of instructional computer use by the mentor teacher and student learning outcomes during their internship (Sahin, Toy, 2009). On the other hand, while using ICT, the students encounter different problems, especially if their activity is directly focused on search for information. This has been also observed by other researchers. A study carried out in the UK in 1992 indicates that students entering initial teacher education have a wide variety of needs regarding information technology (IT), and the proportion of students lacking any computer experience prior to their course varied from 8% to 60% depending on institution and course (Blackmore, Stanley, Coles, Hodgkinson, Taylor, Vaughan, 1992). Researchers also note that in the majority of cases, Word processing is used for creating and editing documents. Our research also indicates that a computer is mostly used for

preparing / writing different documents (application index AI = 0.80). It could be relatively maintained that during the last decade, such tendency has remained unchanged. Therefore, an important issue is a constant examination of the current state and looking for the reasons determining the use of various technologies in the process of studying. Studies at university level can be characterized by a high degree of individualization rapidly growing from the first to the fourth year of studying. More graduate students have much better skills at applying ICT. On the other hand, in terms of using ICT, well trained young people are entering universities. Investigation conducted in Turkey reveals that the undergraduate students strongly agree that computers individualize learning (Usun, 2004). Our research, including different observations within the process of studies along with the interviews with students show that computer technologies significantly contribute to the individualization of studies. Nevertheless, researchers point to the need to create bridges between personal and instructional use of technology for improved student learning (Keengwe, 2007). In this case, it is worth mentioning the effectiveness of organizing the process of studies in terms using ICT. There are cases when personal students' capacities are underused not mentioning the further development of their skills. The factor of the sex is also important. Our study has revealed certain statistically significant deviations between male and female students and confirmed the results of the previous investigation conducted in Barbados that males were more favourable towards the use of computers as replacements to other teaching activities (Gay, Mahon, Devonish, Alleyne, Alleyne, 2006). In any case, technologies are rapidly developing. Another important aspect of research carried out in Lithuania is that currently, it is not enough to discuss students' ability to use a computer or a mobile phone which is emphasized in the latest studies indicating that it is no longer just computers and cell phones that students have access to, but a greater and more mobile range of technology (Gromik, 2009).

The number of ICT is permanently increasing; technologies are changing and gaining more advanced qualities. Whatever limitations and exceptions should be analyzed, a technologically sophisticated young generation is entering universities. When facing information technologies traditional methods of teaching are inefficient and low effective (Pečeliūnaitė, 2006). In the process of studies, the students should be provided more possibilities of using not only usual forms of ICT but also those having more innovative and advanced technologies. In terms of research, the constant monitoring of the current situation and the correction of studies are necessary.

## Conclusions

Having concluded the findings of the carried out research *A Student and Information and Communication Technologies*, it can be maintained that:

- The surveyed fourth-year undergraduates have almost unlimited possibilities of using a computer, mobile phone, the Internet and an electronic data storage device - USB flash drive.
- Relatively new and expensive digital technologies such as an e-library, a palmtop computer, iPod touch and GPS navigator are still rarely applied.
- A computer is intensively used for both purposes - studying and leisure activities. More complex computer functions (data processing, creating web sites etc.) are more common for male rather than female students.
- The students almost daily use the basic functions of the mobile phone (writing SMS, calling). However, calling to other people using a mobile phone and sending SMS are a more frequent occupation of females as male students are tend to search for information on the Internet and send and receive e-mails.

- The respondents most frequently use the Internet for communication, searching for information and studying. More male than female students use the Internet for different purposes (watch films, play games, buy/sell stuff, download required software). Females more frequently use the Internet for communication.
- The most required types of information and communication technologies for the surveyed fourth-year undergraduates are a computer used for general study and the Internet - to search for information.
- Considering all aspects of using information and communication technologies among the surveyed fourth-year students that graduated from city or regional schools, no statistically significant deviation has been noticed.

## References

Blackmore, M., Stanley, N., Coles, D., Hodgkinson, K., Taylor, C., Vaughan, G. (1992). A Preliminary View of Students' Information Technology Experience across UK Initial Teacher Training Institutions. *Technology, Pedagogy and Education*, 1: 2, 241-254.

Gay, G., Mahon, S., Devonish, D., Alleyne, P., Alleyne, P.G. (2006). Perceptions of information and communication technology among undergraduate management students in Barbados. *International Journal of Education and Development using Information and Communication Technology (IJEDICT),* Vol. 2, Issue 4, pp. 617.

Glosienė A. (2006). Akademinės bendruomenės informacinės kompetencijos ugdymas: po dvidešimt metų. *Knygotyra*, 47, p. 186 - 203.

Gromik, N. (2009). Do you know who we are? Undergraduate students' access to technology: a survey report. *The Jalt Call Journal,* Vol. 5, No. 3, p. 57-66.

Frankowicz, M. (2008). ICT Support for Chemistry Studies – European Experiences. In.: *Information and Communication Technology in Natural Science Education-2008* (Proceedings of International Scientific Conference, 28-29 November 2008). Siauliai: Siauliai University Press, p. 48-50.

Yukiko I. (2007). University Students' Perceptions of Computer Technology Experiences: Questionaire Results and Analysis. In. *Technology and Diversity in Higher Education: New Challenges*. Guam: University of Guam, 308 p.

Keengwe, J. (2007). Faculty Integration of Technology into Instruction and Students' Perceptions of Computer Technology to Improve Student Learning. *Journal of Information Technology Education*, Vol. 6, p. 169-180.

Kennedy, G.E., Judd, T.S., Churchward, A., Gray, K., Kerri-Lee Krause (2008). First year students' experiences with technology: Are they really digital natives? *Australasian Journal of Educational Technology*, 24 (1), p. 108-122.

Lamanauskas, V., Šlekienė, V., Ragulienė, L. (2009). Kompiuterinės technologijos gamtamokslinio ugdymo procese: socioedukaciniai aspektai. *Gamtamokslinis ugdymas / Natural Science Education*, Nr. 3(26), p. 8-26

Lamanauskas, V., Šlekienė, V., Ragulienė, L. (2010). First Year Students` Experiences with Technology: the Case of Lithuania. In. *DIVAI 2010 - Distance Learning in Applied Informatics* (Conference Proceedings, Nitra, Slovakia, May 4-6, 2010). Nitra: Constantine the Philosopher University in Nitra, p. 17-26.

Lamanauskas, V., Šlekienė, V., Ragulienė, L. (2010). Socio-educational Aspects of Applying Computer-Based Technologies in Science Education. In. B.Lazar, R. Reinhardt, (Eds.), *Socio-cultural and Human Values in Science and Technology Education* (XIV IOSTE Symposium, June 13. - 18. 2010, Bled, Slovenia). Ljubljana: Institute for Innovation and Development of University, (CD-room).

Nelson Thomas F. Laird, Kuh George D. (2005). Student Experiences with Information Technology and Their Relationship to Other Aspects of Student Engagement. *Research in Higher Education*, Vol. 46, No. 2, AIR Forum Issue, pp. 211-233.

Mickus, A., Vidžiūnas A. (2009). Stojančiųjų į universitetą informacinių ir komunikacinių technologijų kompetencijos tyrimas. *Informacijos mokslai*, T. 50, p. 64-68.

Studentų apklausos siekiant išsiaiškinti jų informacinių technologijų naudojimą mokymosi procese apibendrinimas (2007). Prieiga per internetą: http://bkp.smk.lt/?lt=1172830059 (2010.07.18).

Pečeliūnaitė, A. (2006). Tradicinės paskaitos virsmas į konstruktyviąją interaktyvioje aplinkoje. *Acta Paedagogica Vilnensia*, T. 16, p. 190-200.

Sahin, I., Toy, S. (2009). Experiences of Turkish Student Teachers in Pedagogy and Educational Technology during an Internship Program in the US. *The Turkish Online Journal of Educational Technology – TOJET*, Vol. 8, Issue 4, p. 16-20.

Smith, S.D., Salaway, G., Borreson Caruso, J. (2009). The ECAR Study of Undergraduate Students and Information Technology, 2009. EDUCAUSE, ECAR Key Findings, p. 1-13. Available on the Internet: http://net.educause.edu/ir/library/pdf/EKF/EKF0906.pdf (20/07/2010).

Turčani, M., Kapusta, J. (2008). Modern University = Modern Education via Internet. In.: *Information and Communication Technology in Natural Science Education-2008* (Proceedings of International Scientific Conference, 28-29 November 2008). Siauliai: Siauliai University Press, p. 110-115.

Usun, S. (2004). Undergraduate Students Attitudes on the Use of Computers in Education. *The Turkish Online Journal of Educational Technology – TOJET*, Vol. 3, Issue 2, p. 62-70.

*Adviced by Naglis Švickus, SMC "Scientia Educologica", Lithuania*

| | |
|---|---|
| **Vincentas Lamanauskas** | Professor, Natural Science Education Research Centre, Siauliai University, 25-119 P.Višinskio Street, LT- 76351, Siauliai, Lithuania.<br>Phone: +370 687 95668.<br>E-mail: lamanauskas@projektas.lt<br>Website: http://www.lamanauskas.projektas.lt |
| **Violeta Šlekienė** | Associate Professor, Head of Department of Physics, Faculty of Natural Sciences, Šiauliai University, 19 P. Visinskio Street, LT-77156 Siauliai, Lithuania.<br>**Phone:** +370 41 595721.<br>**E-mail:** fk@fm.su.lt<br>Website: http://www.su.lt/   This e-mail address is being protected from spambots. You need JavaScript enabled to view it |
| **Loreta Ragulienė** | Associate Professor, Lecturer of Department of Physics, Faculty of Natural Sciences, Šiauliai University, 19 P. Visinskio Street, LT-77156 Siauliai, Lithuania.<br>**Phone:** +370 41 595721.<br>**E-mail:** fk@fm.su.lt<br>Website: http://www.su.lt/ |