INTERNET AND COMPUTER USE AMONGST EUROPEAN PHARMACY UNDERGRADUATES: EXPLORING SIMILARITIES AND DIFFERENCES

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Abstract

Computers and Internet use are very common in contemporary world. On the other hand, little is known concerning Internet use by pharmacy undergraduates in culturally diverse European countries, recognizing pharmacists as an extensive and homogeneously trained European workforce. To address this, a questionnaire-based survey was used. There were 654 participants from Estonia (4.1%), Latvia (8.9%), The Netherlands (9.9%), Portugal (32.6%) and Turkey (44.5%), with a majority of female students. Purposes for using the Internet were communication, academic work, social networking, listening to music and watching movies, although significant differences were found in activities beyond academic work. Social media were the most popular websites in all countries. Finally, relevant differences in retrieving up-to-date health information existed. With potential differences in access and retrieval of latest health information and broader use of information technologies, greater convergence of competencies in this area would be desired, considering a shared European e-healthcare and pharmaceutical marketplace.

Rezumat

Computerele şi internetul sunt instrumente comune şi omniprezente, deosebit de importante în învăţământul superior. Cunoştinţele referitoare la utilizarea internetului deţinute de studenţii farmacişti din ţări europene, care prezintă diversitate culturală, definesc farmaciştii drept o forţă de muncă extensivă şi omogenă, instruită în Europa. În vederea abordării acestei probleme s-a realizat un studiu descriptiv, transversal bazat pe chestionare descriptive. Au participat 654 studenţi farmacişti din Estonia (4,1%), Letonia (8,9%), Olanda (9,9%), Portugalia (32,6%) şi Turcia (44,5%) din care majoritatea au fost de sex feminin. Studenţii de origine turcă au utilizat cel mai puţin computerele şi internetul. Majoritatea au menţionat că folosesc internetul pentru comunicare, lucrări academice, socializare, muzică şi vizionarea filmelor, deşi diferenţe semnificative s-au constatat în cazul altor activităţi decât cele academice. Site-urile de socializare au fost cele mai populare în toate ţările. Studenţii portughezi şi estonieni au afirmat că au o mare încredere în internet ca mediu pentru dezvoltarea socială, în timp ce studenţii turci sunt mai îngrijoraţi de influenţele negative produse de interacţiunile sociale. În final s-au constatat diferenţe semnificative în obţinerea de informaţii de actualitate privind sănătatea. Datorită diferenţelor potenţiale determinate de accesarea şi obţinerea informaţiilor actualizate precum şi a utilizării pe scară largă a tehnologiilor informaţionale, în practica medicală comună ("e-healthcare") şi pe piaţa farmaceutică europeană este de dorit o mai mare convergenţă a competenţelor din acest domeniu.

Keywords: Internet use, pharmacy students, computer-mediated communication, pharmaceutical sciences

Introduction

Internet use has become important to most daily activities, from work and entertainment to education and participation in society [1]. Since the 1990's, communication and information through Internet has been increasingly used by large communities [2]. European statistics show that 75% of all European citizens (EU-27) are using Internet, with Central and Nordic countries as the most active and

Southern countries comparably less active [1]. Additionally and according to Eurostat, in 2012 the percentage of households with Internet connection and broadband use was greater, for instance, in The Netherlands and Estonia than in countries such as Portugal and Turkey [3].

Internet communication is preferred due to speed and ease in many services and activities as compared to other ways of information gathering [4]. A notable example of its impact is the globalisation and elimination of shopping borders [5]. However, it is known that Internet may also have disadvantages, in particular amongst those who intensively use this source, varying from social isolation to physical health issues [6]. For instance, in a study conducted in Switzerland, problematic users were more than twice as likely to suffer from sleep problems compared to other users, almost three-quarter are more likely to develop weight problems and some developed back and other musculo-skeletal problems [7]. With younger generations being the most intense users, students present an interesting group for studying Internet use and potential misuse.

Studying this group enhances our understanding of the potential future, next to obvious better understanding the present. Also, contemporary students are a part of today's digital natives due to their age and the abilities to rapidly adopt new technological developments [8]. Communication, academic work, social networking, listening to music and watching movies are known to be the most popular reasons for using Internet among university students [5-6, 8-10].

Graduate students positively value the use of Internet in their studies [11]. In the pharmaceutical education, initiatives that have used different technologies, such as electronic presentations and course materials posted on the schools' websites were regarded as helpful to the learning process [12]. Notably, variation can be found if comparing pharmacy students with other students in the health-care arena [13, 14]. Also, even in countries with widespread Internet accessibility, some students lack basic computer skills and/or are very sceptical about e-learning and other computer-based resources [15].

No comparative analysis on Internet use has been performed so far on pharmacy students, which do present a rather homogeneous group, with curricula that are equivalent or similar in most European countries [16]. Knowing the cultural and socio-economic differences between Southern and Northern European countries, a comparative analysis focusing on differences and similarities between countries and regions seems worthwhile though. The present study aims to describe Internet use by pharmaceutical sciences undergraduates as well as to establish an initial comparison of this use amongst European countries and regions. Our study may help understanding the European future of pharmaceutical professions in Europe, including whether similarities and differences may hamper or enhance migrations within the European pharmaceutical labour market.

Materials and Methods

Study design and characteristics of the participants
This study follows a descriptive design using a questionnaire-based survey. Pharmacy Schools from Northern, Central and Southern Europe were invited to participate. A total of 748 4th year university students from Estonia, Latvia, The Netherlands, Portugal and Turkey participated. The rationale of choosing 4th year students was that they can be easily accessed as they are not yet in apprenticeship.

Centres involved were public institutions located in capital cities and/or well-known Pharmacy Schools in different countries. Notably, included centres were: Ankara, Gazi, Hacettepe Universities in Turkey; the University of Lisbon in Portugal; the University of Groningen in The Netherlands; the University of Tartu in Estonia; and Universities of Riga Stradinš and Latvia in Latvia.

Questionnaire development
The questionnaire was developed in English by the Turkish team, based on their previous experience on Internet use surveys [17]. The questionnaire was completed with contributions of the partner countries and each local team translated the original instrument into their local language.

Local teams conducted the survey within a weekly period in March 2012 for all countries except The Netherlands, where due to logistic issues the data were collected in September 2012.

Data gathering and analysis
Data gathering and structuring was completed for all countries in December 2012. SPSS 15.0 was used for data entry, merging and qualitative and quantitative analysis. Descriptive and statistical test were applied using the conventional significance level at 0.05.

Results and Discussion

Out of 748 graduate students reached, 654 students (87.4%) participated in the study, varying from 27 in Estonia to 291 in Turkey. The majority of the participants were Turkish (44.5%) and Portuguese (32.6%) students' populations.

Country	Total number of undergraduates 2011/2012	Total no. of students in the selected year (4th grade)	No. of survey participants (%)	Participation rate (%)
Estonia (EE)	169	29	27(4.1)	93.1
Latvia (LV)	449	58	58(8.9)	100.0
The Netherlands (NL)	855	98	65(9.9)	66.3
Portugal (PT)	1413	238	213(32.6)	89.5
Turkey (TR)	2018	325	291(44.5)	89.6
Grand total	**4636**	**748**	**654(100.0)**	**87.4**

Data on socio-demographic, health status and computer/Internet use are presented in Table II.

Latvian students were significantly older than the other participants (25.08 ± 5.9).
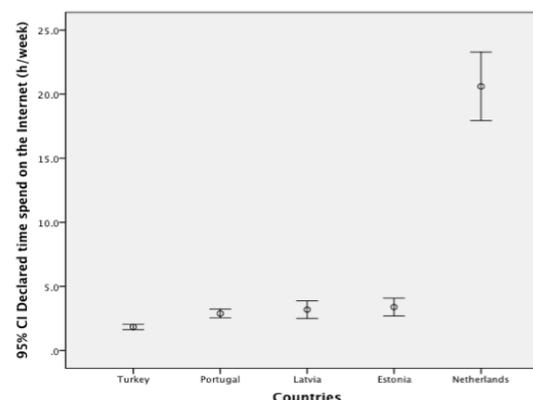
Table II
Characteristics of the students by country

Socio-demographics	Turkey (n = 291)		Portugal (n = 213)		Latvia (n = 58)		Estonia (n = 27)		The Netherlands (n = 65)		p value
	n	%	n	%	n	%	n	%	n	%	
Age (years)											< 0.001[a] *
21 and below	79	27.3	114	53.7	2	3.4	1	3.7	10	15.3	
22	114	39.4	47	22.2	25	43.1	15	55.6	30	46.2	
23 and above	96	33.3	51	24.1	31	53.4	11	40.7	25	38.5	
Total	*289*	*100.0*	*212*	*100.0*	*58*	*100.0*	*27*	*100.0*	*65*	*100.0*	
Mean ± sd	22.52 (3.3)		22.53 (3.8)		25.03 (5.9)		22.48 (0.8)		22.22 (3.1)		
Sex											0.004[a] **
Male	97	33.3	49	23.1	10	17.2	3	11.1	23	35.4	
Female	194	66.7	163	76.9	48	82.8	24	88.9	42	64.6	
Total	*291*	*100.0*	*212*	*100.0*	*58*	*100.0*	*27*	*100.0*	*65*	*100.0*	
Computer use (h/day)	2.73 (2.19)		4.98 (4.32)		4.20 (2.59)		4.16 (1.91)		NA		< 0.001[b]
Internet use (h/day)	2.54 (2.25)		4.34 (4.01)		3.62 (2.67)		3.74 (1.82)		20.60 (10.61)		< 0.001[b]
Diagnosed diseases											0.012[a]
No	231	80.5	176	88.9	54	93.1	23	85.2	60	92.3	
Yes	56	19.5	22	11.1	4	6.9	4	14.8	5	7.7	
Total	*287*	*100.0*	*198*	*100.0*	*58*	*100.0*	*27*	*100.0*	*65*	*100.0*	
Health problems resulting from Internet/computer use											0.171[c]
No	262	90.7	201	98.0	56	96.6	22	81.5	62	96.9	
Yes	27	9.3	4	2.0	2	3.4	5	18.5	2	3.1	
Total	*289*	*100.0*	*205*	*100.0*	*58*	*100.0*	*27*	*100.0*	*64*	*100.0*	

* Statistically significant difference arose from the Latvian participants; ** Sstatistically significant difference arose from the Turkish participants; [a] Pearson Chi-Square; [b] ANOVA; [c] Fisher's Exact Test

The amount of the participants' spent by using a computer varied between 1 hour (19.3%) to 5 hours (8.1%) per day (24 h) (Figure 1). The average time of computer use was obviously strongly correlated with the Internet use (r = 0.908, p < 0.001). Noting this, Figure 1 presents the mean values of Internet use for the participating countries. These values were statistically significant differing between The Netherlands and all other countries (p < 0.0001) as well as significantly greater in all other countries as compared to Turkey (p < 0.001). Table II confirms these differences in computer use, with Turkey being significantly below the other participating countries (p < 0.001).

Students' Internet use is presented in Table III. For all countries, students used Internet more outside (e.g. at home) than inside the school, except in The Netherlands. Turkish students reported less frequent use of Internet at home than students in other countries (p < 0.001).

Figure 1.
Pharmacy undergraduates reported mean values of Internet use for the participating countries

Table III

Students' Internet use by country

	Turkey (n = 291)	Portugal (n = 213)	Latvia (n = 58)	Estonia (n = 27)	The Netherlands (n = 65)	p value
Internet use at school	198 (68.8%)	154 (77.4%)	25 (43.1%)	24 (88.9%)	61 (93.8%)	< 0.001
Internet use at home	214 (74.3%)	197 (99.0%)	55 (94.8%)	26 (96.3%)	54 (83.1%)	< 0.001
Internet access *via* cell phone	164 (56.4%)	73 (36.0%)	11 (19.0%)	16 (59.3%)	65 (100.0%)	< 0.001
Internet use purpose:						
Communication	237 (82.0%)	158 (78.6%)	49 (84.5%)	23 (85.2%)	65 (100.0%)	0.637[a]
Academic work	236 (81.7%)	172 (85.6%)	47 (81.0%)	21 (77.8%)	59 (90.8%)	0.315[b]
Social networking	229 (79.2%)	149 (74.1%)	46 (79.3%)	23 (85.2%)	61 (93.8%)	0.016[a]
Music	220 (76.1%)	139 (69.2%)	40 (69.0%)	25 (92.6%)	58 (89.2%)	0.002[a]
Movies	220 (76.1%)	126 (62.7%)	46 (79.3%)	24 (88.9%)	47 (72.3%)	0.002[a]
Shopping	132 (45.7%)	40 (19.9%)	23 (39.7%)	11 (40.7%)	42 (64.6%)	< 0.001[a]
Chatting	107 (37.0%)	105 (52.2%)	44 (75.9%)	26 (96.3%)	37 (56.9%)	< 0.001[a]
Gaming	96 (33.2%)	44 (21.9%)	18 (31.0%)	5 (18.5%)	20 (30.8%)	0.058[a]
Gambling	26 (9.1%)	3 (1.5%)	5 (8.6%)	1 (3.7%)	2 (3.1%)	0.001[c]
Developing software	8 (2.8%)	12 (6.0%)	11 (19.0%)	5 (18.5%)	4 (6.2%)	0.126[c]

[a] Pearson Chi-Square; [b] Fisher's Exact Test; [c] Continuity Correction (Yates)

Results for the exact websites visited by the students are presented in Table IV. The most frequently used websites were reported to be social media (frequencies varying between 90.8% and 62.1%) and newspapers (from 81.5% to 36.2%). All of the faculties, except Gazi and Hacettepe Universities, were using online sources with the purpose of education.

Students' opinions and attitudes related to issues surrounding Internet use are presented in Table V. The majority of the students in each country report they have rapid access to information sources, with even 100% of participating Estonians reporting this.

Table IV

Websites visited by the students from each country

	Turkey (n = 291)	Portugal (n = 213)	Latvia (n = 58)	Estonia (n = 27)	The Netherlands (n = 65)	Total (n = 654)	p value
Social media	236 (81.4%)	144 (72.7%)	36 (62.1%)	23 (85.2%)	59 (90.8%)	498 (76.1%)	< 0.001[a]
Newspapers	221 (76.2%)	107 (54.0%)	21 (36.2%)	22 (81.5%)	37 (56.9%)	408 (62.4%)	< 0.001[a]
Shopping	125 (43.1%)	37 (18.7%)	19 (32.8%)	8 (29.6%)	8 (12.3%)	197 (30.1%)	< 0.001[a]
Pharmacy-related sites	103 (35.5%)	65 (32.2%)	35 (60.3%)	9 (33.3%)	28 (43.1%)	240 (36.7%)	0.003[a]
Gaming	48 (16.6%)	22 (11.1%)	28 (48.3%)	- (-)	3 (4.6%)	101 (15.4%)	< 0.001
Travel	29 (10.0%)	55 (27.8%)	32 (55.2%)	2 (7.4%)	10 (15.4%)	128 (19.6%)	< 0.001[a]
Gambling	20 (6.9%)	2 (1.0%)	4 (6.9%)	- (-)	- (-)	26 (4.8%)	0.008[a]

[a] Pearson Chi-Square; [b] Fisher's Exact Test

Attitudes and opinions of the students on Internet-related issues by country

	Turkey (n = 291)	Portugal (n = 213)	Latvia (n = 58)	Estonia (n = 27)	The Netherlands (n = 65)	Total (n = 654)	p value
I can rapidly access information sources *via* Internet	264 (92.6%)	174 (90.6%)	47 (81.0%)	27 (100.0%)	63 (96.9%)	575 (87.9%)	< 0.007[a]
I can access correct/relevant data sources via Internet	209 (74.1%)	162 (85.2%)	40 (69.0%)	25 (92.6%)	64 (98.5%)	500 (76.5%)	< 0.001[a]
Internet may sometimes violate one's privacy	232 (81.4%)	114 (59.4%)	18 (31.0%)	7 (25.9%)	36 (56.3%)	407 (62.2%)	< 0.001[a]
Internet makes me feel closer to other people in the world	109 (38.2%)	129 (67.5%)	28 (48.3%)	18 (66.7%)	31 (48.4%)	315 (48.2%)	< 0.001[a]
Internet use adversely influences my education performance	94 (32.8%)	68 (35.8%)	9 (15.8%)	13 (48.1%)	19 (29.2%)	203 (31.0%)	< 0.022[a]
Time spent on the Internet adversely affects my social relationships (family, friends etc.)	86 (30.1%)	44 (22.9%)	13 (22.4%)	1 (3.7%)	7 (10.8%)	151 (23.1%)	< 0.001[a]
I feel isolated because of Internet use	45 (15.7%)	9 (4.7%)	3 (5.2%)	1 (3.7%)	3 (4.7%)	61 (9.3%)	< 0.001[a]

[a] Pearson Chi-Square

The results of this study provide valuable evidences on how Internet is being used by pharmacy students from countries belonging to a shared labour market [18]. Common *syllabus* structure and content in all studied countries and shared visions on pharmacists' competencies, most universities are presently running their programmes on e-learning platforms, accessed from the Internet. In this sense, exploring Internet use by a European – but nationally diverse – sample of pharmacy undergraduates provides valuable information on both similarities and differences for a group of core future healthcare providers. Also, this matter is relevant considering the migratory fluxes between European countries generally associated with labour market attractiveness and employment, admitting that comparable e-professional competencies enhance migration through Europe.

Demographics and technology-related differences
The pharmaceutical profession in Europe is predominantly a female occupation [19, 20] and this predominance was also found in all the surveyed countries. Concerning participants' age, students from the University of Latvia were the oldest in this sample, but all within the expected age range of young adults.
Beyond the demographic apparent homogeneity, computer and Internet use varied significantly between the studied countries, with a lower overall use for the Turkish participants. This lower use can be explained by relatively low computer penetration rates at home in Turkey among the five countries, with e.g. 57.5% in West Anatolia [10]. Anyway, Internet use was greater at home than at the universities for all countries, except for the Dutch students. These were the most active undergrads and a higher use on campus here might indicate more hours spent at the university site in general

with good facilities being available. All participants confirmed access to the Internet from mobile devices. This is in line with Eurostat data where a large increase of mobile Internet use was found across Europe, and especially in the Central and Northern countries [1].

Internet and education
Internet use for communication and educational purposes was found not to differ from country to country. This suggests a common electronic ground for studying pharmacy, although information sources may vary from country to country. Other computer-based activities, which presently are usual amongst the younger populations [21], such as online shopping and chatting, varied amongst sampled countries, with Latvians clearly being the most active on pharmacy-related web sites. More importantly, results confirmed the central role of computers and Internet for communication and performing academic work. All countries presented high percentages (around 80% and above) for those activities, which have a clear implication on the development of teaching and learning. Educators should not neglect the progressive, but continuously, swift to online education, while keeping the right balance between media-based/distant (synchronous and asynchronous) and face-to-face teaching [22]. With respect to the latter, a laboratorial component still requires students' presence and actual lab work, yet in the absence of virtual educational labs.
Social networks have emerged as important tools for maintaining and improving social capital [9, 23]. Although statistically significant differences were found in this sample, high use of social networks was observed in all countries. That high use of social networks may take a lot of time and interrupt academic working and success. This may lead the

teaching staff to remember their roles and responsibilities: the emergence of an "e-professionalism" concept, the legal and ethical implications of online postings in students' educational decisions, how online personas may blend into professional life – all these factors increase educators' role demands [24]. Significant differences were also found amongst countries when looking at the type of mostly visited websites: social media and newspapers were popular, while (non-scientific) pharmacy related websites received quite low attention, except for the Latvian students. Knowing there is a great presence of computers and Internet in students' academic and personal lives, participants seemed to remain distant from online pharmacy and medical information. This is surprising with these students being near to start a professional life and enter the pharmaceutical labour market, but in line with others' findings [25]. Still, this finding may also reveal a sound critical attitude in relation to potential credibility and quality issues of online information available from non-institutional web sites [26].

Internet and computer use concerns
Some previous results were confirmed [27], with a good accessibility and trust in most Internet information resources. Nevertheless, except for the Baltic countries, students have stated concerns in relation to privacy violation, which might be a source of psychological stress and disorders, especially in cyber bulling situations [27]. Estonian students were those least concerned with this issue; actually, they believe the Internet is a good tool for managing global information and relationships, avoiding social isolation. Conversely, Turkish students were trust-worthy with respect and concerned that intense use might affect education performance and social relation-ships, particularly with individual negative outcomes as a result, inclusive isolation. Again, this might be a result from cultural and social structures, and the multivariate and complex nature of these attitudes would benefit from other methodological approaches. Heavier users of computers and Internet might present an addictive behaviour, suffering from loneliness or weak social relationships [2, 9]. For Turkish students a relation between loneliness, depression and computer self-efficacy, with Internet for entertainment and social interaction represent important risk factors [28, 29]. Actually, time spent on the Internet can be related with the "temporal dissociation" component of the "cognitive absorption" [30]. Also, adverse effects of Internet use may stem from other sources, such as social anxiety [31].

Conclusions

According to the results of this study, the use of Internet and computers among pharmacy students during their post-secondary education seems to be equivalent among culturally diverse countries. Findings do reflect some social and technological differences, with a gap existing, for example, between The Netherlands and Turkey. This may not necessarily forecast significant cleavages in professional behaviour, if core professional competencies are well trained. Misuse does not seem alarming in the countries studied, although some precautions can be taken for possible future risks in the context of further utilization of online academic and professional resources.

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