

# INFORMATION AND COMMUNICATION TECHNOLOGY IN TERTIARY EDUCATION INSTITUTIONS IN SLOVENIA – A PREREQUISITE FOR E-LEARNING

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## ABSTRACT

*In 2003 research on information and communication technology presence and usage was conducted among tertiary education institutions in Slovenia. The basic purpose of the research was to draw up indicators for EU comparisons, following the requirements of Eurostat. Out of 84 Slovenian tertiary education institutions, 81 responded to the mail survey with telephone follow-up. The basic benchmark finding is that overall there are 5 PCs per 100 students. Better computer facilities are found in technical and natural sciences institutions, and private institutions in the fields of economics and education. The research results also show that employees are much better equipped, as there are more employee-used PC's than employees. All institutions have Internet access, almost 60% of them also have their own e-mail servers, but only half of them provide e-mail addresses for their students on the domain of their institution. Exam registration and on-line exam results are provided by slightly more than a half of institutions, e-mail information alert about exam results is provided by one quarter of institutions, online application is provided only by one tenth of institutions. Distance online learning for certain courses/subjects is provided by 17% of institutions, whereas 9% offer distance learning for certain study programs. The majority of institutions are preparing their online degree programs - only 22% of them have no plans to offer e-learning (distance education) courses in the near future. E-learning education is most frequently provided by private institutions in the field of economics, and rarely found in the fields of medicine and health care, social sciences and education.*

**Keywords:** information technology, electronic learning, tertiary education institutions, Eurostat, Slovenia

## INTRODUCTION

Due to profound changes related to the third industrial revolution, knowledge gained during academic studies becomes very quickly obsolete. The perception of the need for knowledge upgrading is also related to the concept of lifelong learning (7), which, through formal, informal and non-formal education makes possible active citizenship, employability, social inclusion and personal fulfillment. Therefore, the life-long learning process becomes a life-wide learning process, which can build a better society through learning (2).

Because gaining new knowledge relates to the active part of the population, new forms of teaching and learning appear in the market for education and training programmes, supported by information and communication technology - ICT. One of these contemporary forms of

education and training, which is a keen ICT user, above all the Internet and Internet technology, is electronic or e-learning. E-learning can be carried out as distance education or as a supplement to traditional, face-to-face forms of teaching (6). E-learning is impacting education in Slovenia (3), with the number of Internet users in Slovenia increasing (according to RIS data 44 – 49% of Slovenian households have Internet access) (4).

Regardless of the way through which e-learning is implemented, institutions willing to enter the market for educational services have to be appropriately and sufficiently equipped with information and communication technology. In our research, we were interested if tertiary i.e. tertiary education institutions were appropriately and sufficiently equipped for providing their education and training programs through e-learning, and by that to respond to the demands of the market for on-line distance learning or e-learning.

We are aware that an appropriate level of ICT equipment and its usage are two basic conditions for the introduction and implementation of e-learning, and that educational institutions (as well as the government) play a key role, as they should, in facilitating the introduction and usage of new ICT. Also, they should not limit e-learning initiatives with their rigidity and regulations, especially in the case of state owned institutions.

## **METHODOLOGY**

### **Data collection**

The research on informatisation of tertiary education institutions – RIS2003 has been carried out within a framework to draw up indicators for the Information Society of the European Union. In Slovenia, there are 84 tertiary education institutions. Our research surveyed them all. The survey was carried out in May 2003, and started with the sending of questionnaires by post. Questionnaires were (supposed to be) answered by the person in charge of ICT usage for educations and research purposes at the institutions.

The response to the questionnaires was good, but not all respondents provided answers to all questions. The question inquiring about the number of students was answered by 81 institutions (96%), the question about employees and the level of ICT facilities found at institutions was answered only by 72 (86%) institutions. Thus all indicators are calculated for an average institution.

### **Sample presentation**

Surveyed institutions were classified according to the area of activities offered by the institution. Economics is the area with the majority of students (37%), followed by technical and natural sciences (27%), social sciences and education (22%), the humanities (8%) and medicine and health care (6%).

There are 104,432 students studying at 81 educational institutions in tertiary education, with 92.8% in undergraduate studies and 7.2% in postgraduate studies. In undergraduate studies, there are 64.5% full-time students and 35.5% part-time students.

On average, one tertiary educational institution has 1,405 students enrolled, with substantial differences in the number of students, as the majority of students study at public institutions. The number of students enrolled at private institutions is considerably lower. The smallest educational institution (providing only undergraduate studies) has only 10 students, the biggest 10,845 (providing both undergraduate and postgraduate studies, as well as full-time and part-time studies) students. The majority of students study social sciences and the humanities (70.5% of all students). Faculties providing studies in technical and natural sciences have 23.9% of students, with 5.6% of students in medicine and health care. Economics and business is the field with the majority of Slovenian students (41.3%).

Tertiary education institutions employ 4,947 people (19% in administration and 81% teachers and researchers). On average, 55 teachers and researchers work at an average tertiary education institution, with 13 people in administration. There are 25 students per teacher or researcher. The highest number of students per teacher is in the field of economics (64), with the lowest number in medicine and health care, with only 9 students per teacher or researcher.

## **MAIN FINDINGS**

Next, we will summarize only the most important findings of the research RIS2003, which reflect the level of ICT facilities in tertiary education institutions, necessary for the development, introduction and implementation of e-learning.

### **Computer equipment in tertiary education institutions**

Slovenian tertiary education institutions differ in the number of students as well as in the level of ICT facilities. Private institutions are much better equipped than public institutions. There are significant differences in the number of computers per 100 students (16 computers in a private school compared to only 3 computers in a public school), as well as in the number of computers per 100 teachers/researchers (97 computers in private schools and 22 in public schools). In administration, differences are much smaller (19 computers per 100 employees in private sector and 12 computers in public schools).

Of 10,357 personal computers found at the institutions of tertiary education, 37% is available for use by students, 63% for employees (of which 16% are for administration, 84% for teachers or researchers). Only at private institutions do students have access to a bigger share of computers (65%) than employees. Here, it should be noted that private institutions are usually smaller, with a smaller number of students and teachers who are mostly employed under contract and also work at other institutions.

On average, and for an average institution in tertiary education (taking into account the number of students at a certain institution), the level of ICT equipment provided is best at institutions in the field of medicine (on average, 4.4 computers per 100 students), and worst in the field of humanities (1.9 computers per 100 students).

Computers are mainly available for students in computer rooms, which are provided by 90% of surveyed institutions. There are few institutions in tertiary education (only 1%), without at least one such computer room available for use by students. On average, there are almost three (2.7) computer rooms at tertiary education institutions, together with more than one room of the library or reading room type with computers available for students (1.3). In addition to organized computer lectures carried out in computer rooms, computers are available for students for their individual work activities. Most often, a computer room is used (in 62% of institutions), followed by a library or a reading room (57% of institutions). In computer rooms, students can, on average, use computers during working days for 10 hours a day, in libraries for 9 hours daily (3 hours less on Saturdays).

The level of ICT facilities available for teachers and researchers is almost the same regardless of the field of activity of the tertiary education institution, as there are, on an average institution in the field of humanities, 111 computers per 100 teachers or researchers, 162 in social sciences (168 in the field of economics and business).

Administration in the field of social sciences seems to be best equipped, as there are 155 personal computers per 100 administrative workers, and least equipped in the humanities, where there are only 70 computers per 100 employees.

For the introduction of e-learning, computers with Internet access are of utmost importance. On average, 95% of computers available for students have Internet access. The share of computers with Internet access is higher than 90% at all institutions. An average tertiary education institution in Slovenia is equipped with 3.2 personal computers with Internet access per 100 students.

### **Use of ICT in tertiary education institutions**

All surveyed institutions have Internet access. Individual institutions connect to the Internet in different ways. 68% of surveyed institutions have access through a leased line set up by the Academic and Research Network of Slovenia (ARNES), one fifth of institutions have ADSL access, 16% ISDN access. 7% have access either through a leased line set up by a commercial Internet provider, cable Internet provider (7%) or have a dial-up access.

More than a half of surveyed institutions (59%) have their own e-mail server, but only 37% of surveyed institutions provide e-mail addresses for their students on the domain of the institution. E-mail addresses for students are more often provided by institutions in the field of medicine and health care, as well as by institutions in the field of technical and natural sciences. Only at one fourth of surveyed institutions (26%) do university teachers, assistant professors and researchers have updated web pages, mainly at private institutions and institutions in the field of technical and in natural sciences.

Free office programs or programs based on open code are used only by 7% of surveyed institutions, with one third having such plans for the future. Use of free computer programs is most widely spread at institutions in the field of medicine and health care (with 25% of such institutions already using such programs), least spread at institutions in the field of economics

and business (at only 4% of surveyed institutions) and the humanities, where such programs are not used at all.

The possibility for online exam registration and the availability of on-line exam results is provided by slightly more than a half of tertiary education institutions (51% and 55%), exam results are available via e-mail by a quarter of institutions (24%), whereas 13% provide exam results via SMS. One tenth of institutions provide online application software.

As to the extent of online services, institutions in the field of economics range first - 77% of them provide online exam registration, 42% provide information via e-mail, 27% provide information via SMS, 81% provide online access to exam results and 23% provide on-line application.

### **E-learning or on-line distance learning at tertiary education institutions**

On-line distance learning through the Internet, at least in the form of individual subjects of study programs, is provided by 17% of surveyed institutions, whereas a complete study program is provided by 9% of institutions, with almost 35% of surveyed institutions preparing individual subjects for on-line distance learning, and one fifth of institutions preparing whole study programs for on-line distance learning.

## **DISCUSSION**

The use of the Internet is one of the prerequisites for the development of on-line learning. In Table 1, we compare Internet usage in Slovenia, EU-15 and in the United States. The number of Slovenians using the Internet is much smaller than the number of users in the EU and the US, but the number of those using the Internet for more than 2 years is higher in Slovenia than in the EU.

	<b>SLO</b>	<b>Index/EU</b>	<b>EU - 15</b>	<b>Index/EU</b>	<b>US</b>	<b>Index/EU</b>
Internet usage (last 4 weeks) in %	37	80	46	100	69	150
Experience of Internet usage (more than 2 years) in % of Internet users	69	125	55	100	79	144

**Table 1: Comparison of Internet usage in Slovenia, EU – 15 and the United States (5)**

SIBIS research data were collected in 2002 (5). A look at RIS data shows that the number of Internet users has been growing in Slovenia, thus bridging the divide between Slovenia and Europe.

Interestingly, Table 2, shows clearly expressed educational desire, classical as well as e-learning. Slovenia lags behind the EU and the US, both with regard to the expressed desire for learning in general as well as the use of e-learning. It can be noticed that education is mostly provided on-line in the US, which is where the US differ mostly from the average country in the European Union.

		SLO	Index/EU	EU-15	Index/EU	US	Index/EU
Participation in any learning (in last 4 week) – (%)		30	73	41	100	57	139
Usage of e-learning (%)	Online	4	44	9	100	17	189
	Offline	3	60	6	100	6	120
	No e-learning	93	109	85	100	77	91

**Table 2: Learning readiness and e-learning in Slovenia, EU-15 and the US(5)**

In Table 3, data on the level of IT facilities in tertiary educational institutions collected in the research were combined with data available from Eurostat (1).

	% of population using Internet (Oct. 2003)	Index/EU	# of PCs per 100 students	Index/EU	% of Internet access	Index
Slovenia (Sep. 2003)	47%	84	3.2	29	94%	98
EU – 15 (Jan. 2002)	56%	100	11	100	93%	100

**Table 3: Data comparison between the EU and Slovenia**

As seen from Table 3, Slovenia is lagging behind the EU in the number of computers per 100 students, which can be a serious obstacle for the introduction and implementation of e-learning. Luckily, the Slovenian population is rather well equipped (% of Internet users), which can encourage further development, introduction and usage of on-line education and e-learning.

## CONCLUSION

As seen from research results and their comparison with research results available for the EU and the US, Slovenian tertiary education institutions are, on average, not well and appropriately equipped with ICT (especially with regard to the rather limited number of personal computers per student). That is only one of the reasons that education institutions are currently unable to effectively develop, introduce and provide their study and educational programs in the form of e-learning. This especially applies to computer applications used in e-learning, especially at public institutions in the area of social sciences and the humanities.

Of course, the necessary ICT is only one conditions for the introduction and usage of on-line education or e-learning, which necessitates appropriate level of computer and Internet literacy of all participants (not only students), motivation of people to participate in educational activities in general (motivation is lower in Slovenia than, on average, in Europe as well as lower than in the US - Table 2), as well as willingness to meet education requirements utilizing ICT.

Last but not least, the introduction of ICT in education, similarly as the introduction of ICT in companies, demands a renewal of educational, administrative and managerial processes, which is an organizational and managerial problem.

We believe that, regardless of the fact that on average tertiary educational institutions in Slovenia are not appropriately equipped with ICT, this is not the key reason for a relatively poor supply of e-learning services. The key reasons for a relatively poor supply of educational programs in the form of e-learning are mainly of organizational, managerial, and financial nature what is a real challenge not only for the researchers of the area but as well as the administration of tertiary education institutions.

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