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Paper Accepted[1] **ISSN Online 2406-0895**

Original Article / Оригинални рад

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Informatics literacy among first-year students of medicine, dentistry and pharmacy at the University of Niš in compliance with European Computer Driving Licence

Информатичка писменост студената прве године студија медицине, стоматологије и фармације на Универзитету у Нишу у складу са *European Computer Driving Licence*

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Received: July 4, 2018
Revised: March 14, 2019
Accepted: May 7, 2019
Online First: May 22, 2019
DOI: https://doi.org/10.2298/SARH180704047V

Paper accepted

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Информатичка писменост студената прве године студија медицине, стоматологије и фармације на Универзитету у Нишу у складу са *European Computer Driving Licence*

SUMMARY

Introduction/Objective Having taken into account the complex role of students and teachers participating in the global education system and the creation of European Higher Education Framework, it was necessary to perform research on Informatics Literacy (IL). Therefore, our aim was to analyze IL of the students including the knowledge of each of the four core modules and two standard European Computer Driving Licence (ECDL) modules, as well as to propose measures to improve students' IL.

Methods We conducted a cross-sectional study during 2015/2016 at the Faculty of Medicine, University of Niš, and included 292 first year students. Parts of the questionnaire that related to the self-assessment, as well as the test of knowledge in Informatics, modeled after the ECDL consisted of questions from six thematic sections.

Results The study included 88 male (30.1%) and 204 female (69.9%) students. The computer is mostly used for the Internet (69.5%), then for entertainment (24.3%), and seldom for data processing programs (6.2%). Medical students showed higher level of knowledge of all six modules ($p < 0.001$). Male students also had higher level of IL (OR = 0.38, 95% CI: 0.20–0.73). Students who completed high school showed better IL compared to students who completed secondary medical school (OR = 0.34, 95% CI: 0.18–0.66). Education of parents and monthly income had no impact on students' IL.

Conclusions IL of students is not satisfactory. It is necessary to modify the Informatics curriculum according to European standards and to introduce the course to all study groups.

Keywords: informatics literacy; students; ECDL

САЖЕТАК

Увод/Циљ Анализа информатичке писмености испитиваних студената преко познавања сваког од шест основних модула и два стандардна модула *ECDL*-а (*European Computer Driving Licence*), као и утврђивање предлога мера за унапређење информатичке писмености студената.

Методе Студија пресека спроведена је у току школске 2015/2016. године на Медицинском факултету Универзитета у Нишу и њоме су обухваћена 292 студента прве године интегрисаних академских студија Медицине, Стоматологије и Фармације. Делови упитника који су се односили на самопроцену, као и на проверу знања из Информатике, према узору на *ECDL* су се састојали од питања из шест тематских целина – модула.

Резултати Испитивано је 88 младића (30,1%) и 204 девојке (69,9%). Рачунар користе најчешће приликом употребе интернета (69,5%), затим у сврху забаве (24,3%), а најређе за употребу неких од програма за обраду података (6,2%). Међу студентима различитих студијских група постоји значајна разлика у познавању рада свих шест испитиваних модула и то у корист студената медицине ($p < 0.001$). Студенти мушког пола имају већи степен информатичке писмености у односу на студенте женског пола (*OR* = 0.38, 95% *CI*: 0.20–0.73). Студенти који су завршили гимназију показују бољу информатичку писменост у односу на студенте који су завршили средњу медицинску школу (*OR* = 0.34, 95% *CI*: 0.18–0.66). Стручна спрема родитеља, као ни месечна примања нису показали да имају утицаја на информатичку писменост студената.

Закључак Основна информатичка писменост студената није на задовољавајућем нивоу. Неопходно је модификовати наставни план из Информатике према европским стандардима, уз увођење предмета на свим студијским групама.

Кључне речи: информатичка писменост; студенти; *ECDL*

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INTRODUCTION

What is informatics literacy?

The need for literacy has changed over time, so that policy and teaching of literacy nowadays is beyond the scope of understanding it in the past. Primary or elementary literacy includes reading and writing skills. Secondary or functional literacy includes understanding of written documents in everyday life (eg. filling instructions and forms). Tertiary literacy encompasses informatics, computer, Internet, SMS literacy, etc. The development of information technology and its presence in all segments of society has led to increased understanding of broader concept of informatics literacy (IL) which is the basis for the development of modern society [1].

The terms "informatics literacy" (IL) and "information literacy" are different. The term "information literacy" refers to the ability to collect, transfer, and process data and use the specific information, while "informatics literacy" (computer literacy) refers to the general ability for work on the computer and use of computer programs [2, 3, 4]. Although nowadays they are considered interlocked, they are not synonymous.

Since the 1990s, there have been frequent discussions about computer literacy as a skill that everyone should adopt in order to be able to work effectively in the modern world. In fact, computers have become an inevitable tool not only in all disciplines and areas, but in everyday life as well. The concept, then, has been expanded to some basic informatics knowledge, and started to include IL. However, there was no defined standard, which could determine the level of knowledge and skills required for IL.

The aim of education is to create conditions for scientific literacy based on developed informatics and information literacy in the process of creating the knowledge society [2, 3]. In the case of higher education, it is necessary to create such conditions that would enable every

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student to be the part of the system in which new values are deeply rooted in knowledge and there its foundation will be created, grounded in informatics and information literacy (IL).

In the field of higher education it is expected that students and teachers can respond to all elements of IL, which provides education with the role of the common good, as proclaimed by the UNESCO Conference on Higher Education in Paris in 2009 [2, 4]. Some of the proclaimed goals include IL set by UNESCO in 2004, the goals of life-long learning and distance learning in higher education from 2005, as well as goals adjusted to Bologna documents on higher education in Europe - Bologna Process, 2010 [2, 4–7].

European Computer Driving Licence Foundation (ECDL)

The European Commission has launched an initiative in 1995 to increase the level of IL in Europe. Thus, in Dublin in 1997 an institution called the European Computer Driving Licence Foundation Ltd. was founded. Rapidly, European Computer Driving Licence (ECDL) was accepted in many European countries and beyond, and was spread as a method for acquiring IL [8].

In 2003, ECDL received official support from the European Commission, and became the official standard in state bodies of the EU member states. ECDL was accepted for a short time outside the EU, so it is now used in 148 countries and in 36 languages. In Serbia, along with efforts to join the EU defined the ECDL and its "Strategy of development of the information society" in 2006 [8].

ECDL curriculum and syllabus include knowledge assessment of several thematic sections or modules, which may be basic, standard, and advanced.

Basic modules represent a set of primary skills that are essential for each individual. By taking examination in all four basic modules, a person obtains ECDL Start certificate. This level includes the following modules consisting of the skills below:

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1. Basic computer use – knowledge and skills refering to device use, creation and arrangement of files, network and security aspects;
2. Basics of Internet use – knowledge and skills related to Web search, efficient information finding, online communication and e-mail messages;
3. Text processing – knowledge and skills necessary for efficient use of application for creation, formation and final text processing;
4. Tabelar calculations – knowledge and skills necessary for efficient use of applications for creation, formation, changing and use of workingsheets, standard formulas, functions and graphicon creation.

Standard modules represent a set of practical skills used in each of the corresponding areas chosen by candidates themselves according to their needs.at work. There are nine standard modules, and by taking combined examination version with basic modules ECDL Core or ECDL Profile sertificate could be obtained. The standard modules include: (i) Presentations, (ii) Use of data base, (iii) IT safety, (iv) Online collaboration, (v) Image processing, (vi) Web site processing, (vii) Project planning, (viii) 2D Computer Aided Design, and (ix) Use of health information system. (Appendix 1)

Advanced modules allow the user to become "a powerful computer user" and use completely four most common applications. ECDL advanced levels are: Advanced text processing, Advanced table calculations, Advanced databases and Advanced presentations. In accordance with the conclusions of the Commission for education program harmonization with ECDL standards, pupils from elementary or secondary school who obtain very good (4) or excellent grade (5) in Informatics or students at university who get grades 8 (very good), 9 (excellent) or 10 (remarkable) can obtain ECDL certificate. Hereby, the Informatics curriculum has to comply with the ECDL modules in the following way:

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If the curriculum includes all four basic modules, then a student can obtain ECDL Start certificate. If, in addition to four basic modules, the curriculum includes standard modules of Presentations and Database use, then a student can obtain ECDL Core certificate [8].
It is exactly this principle that we used in the analysis of IL among first-year students of the Departments of Medicine, Dentistry, and Pharmacy of the Medical Faculty in Niš, taking into account the fact that similar research has not been conducted according to accepted ECDL European standards in our region. However, the main goal of this research was not only to determine the level of IL acquired during secondary education, but also to find optimal solutions that would increase the IL of students during their studies.

METHODS

The research represents a cross-sectional study carried out in academic 2015/2016 at the Medical Faculty of University in Niš. This study was done in accord with standards of the institutional Committee on Ethics. Out of the total number of 336 first year students of integrated studies of Medicine, Dentistry and Pharmacy 292 of them were included in the study. They gave consent to participate in the study and filled in anonymous questionnaire at lectures and practical. Completing of the questionnaire lasted for 15 minutes, including the time for the interviewer's instructions.

Out of the total number of 195 first-year students of the Department of Medicine, 186 were included in the study; 45 students of the Department of Dentistry (out of 71) and 69 students (out of 70) of the Department of Pharmacy were also included in this study. The questionnaire consists of three thematic units (Appendix 2):

- open and closed questions relating to demographic and socioeconomic characteristics;
- closed questions relating to students' self-assessment of their IL;
- closed questions relating to objective assessment of students' IL.

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Parts of the questonnaire relating to self-assessment as well as objective assessment of Informatics competence based on the test using ECDL, consisted of questions grouped in six thematic units – modules (Figure 1). The part of the questionnaire relating to the self-assessment of competence in six thematic units (modules) from Informatics contained six questions – one question for each module. These six questions had five possible answers from "not enough" (1) to "excellent" grade (5).

Analysis of self-assessment of "Start" and "Core" information literacy of respondents was done in two ways:

- The first way implied that the respondents possessed a "Start" or "Core" information literacy if they had grade 4 or 5 from each of the program modules.
- The second method involved the so-called. "School assessment type", i.e. that the students "passed" all the modules (if they graded their knowledge of each module ≥ 2) and had 4 as the final grade.

The part of the questionnaire that related to knowledge assessment of all six modules consisted of 18 questions, with three questions for each module. (Questions for assessment of students' IL were made in cooperation with experts from the Faculty of Science of the University in Niš and experienced lecturers of Informatics working at the University in Niš). Evaluation of the number of correct answers per module was carried out as follows:
If a student had no correct answers in a given module, he was estimated not to have knowledge in that module. If he had only one correct answer in a module, he was estimated to have low knowledge level. If he answered two questions correctly, he was estimated to possess average knowledge, and if he had all three questions correct, he was estimated to have a very good level of knowledge of a given module.

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As with knowledge self-assessment, the analysis of the results of IL through knowledge examination was done in two ways:

- The first way implied that the student was "Start" or "Core" literate if he answered all three questions correctly in all program modules of the program (grades 4 or 5).
- The second method of analysis was based on the school assessment type – if a student "passed" all the necessary modules (i.e. if he has one correct answer), and received the final grade 4, then he is said to be "Start" or "Core" literate (depending on the observed modules).

Data were processed in Microsoft Office Excel 2007 by teams of two people, whereby crosscheck was carried out for each input. The total number of received questionnaires was 301 but nine questionnaires were eliminated due to incomplete responses, so that the final number of processed questionnaires was 292. Of the 35 questions in the questionnaire, some of which contained sub-questions, 23 variables were made.

The respondents were classified in groups in relation to:

- ✓ gender
- ✓ secondary school completed
- ✓ study programme

The examined factors were compared between these groups. Statistical analysis was performed in SPSS 17.0 (SPSS Inc., Chicago, Il, USA) in Windows 7 environment. The results were presented in tables. Statistical analysis included the application of descriptive statistics (percentage distribution, mean value, median), parametric tests (Student t-test), Spearman rank correlation and nonparametric tests (Pearson's χ^2 test, Fischer's exact test) as well as binary logistic regression model. Statistical significance was taken at $p < 0.05$.

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RESULTS

Assessment of students' knowledge of modules

Out of the total number of 292 examined students, 88 were male (30.1%) and 204 were female (69.9%). One hundred eighty-four students (63%) completed secondary medical school (or similar vocational school), and 108 (37%) completed high school. As for study courses, there were 182 respondents from the Medicine study programme, 44 respondents were from the Dentistry study programme, and 66 respondents were from the Pharmacy study programme. Exactly 138 (47.3%) respondents were satisfied with the informatics knowledge acquired in secondary school, while 154 (52.7%) students were dissatisfied (Table 1).

Almost all examined students (97.9%) possessed and used a computer (at least one). Only four of them reported that they did not own a computer. The average income per household was 76,129.63 Serbian Dinars, with the average number of household members 4.12 (i.e, the average income per household member is 18,487.06 Serbian Dinars). The average number of computers per household was 2.25. The average age when respondents started to use computer was 9.59 years.

Respondents most often used their computer for the Internet (69.5%), then for entertainment purposes (playing computer games, watching movies, listening to music, etc.) (24.3%), and for data processing program (6.2%) (MS Word, MS Excel, MS Power Point, etc.).

The results of self-assessed and examined knowledge of all six modules were presented in Table 2. In terms of the order of the number of students who were trained to work in these thematic units, the result was as follows (very good and excellent grades of respondents were taken into account):

1. Internet – 189 respondents (63,7%)

2. Microsoft Office Power Point – 133 respondents (45,6%)

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3. Microsoft Office Word – 120 respondents (40,2%)

4. Basics of computer use – 69 respondents (23,6%)

5. Microsoft Office Excel – 65 respondents (22,3%)

6. Microsoft Office Acces – 29 respondents (9,9%)

Correlations between self-assessed and examined knowledge of modules

The correlation between self-assessed and examined knowledge was investigated using Spearman's rank correlation. Preliminary analyses were performed to prove assumptions of normality, linearity, and homogeneity of variance. Strong positive correlations were calculated between these two variables. According to Cohen, correlation strength between these two variables was medium ($0.3 < r < 0.49$) for all these modules except for Microsoft Excel, where correlation was slightly lower (Table 3).

Thus, high levels of subjectively experienced knowledge were accompanied by high levels of objectively examined knowledge.

Overall IL of respondents

Comparison of IL between results obtained by self-assessment and results obtained by knowledge assessment was performed in two ways:

Traditional assessment

According to the model of the ECDL, a student is said to have the basic level of IL ("Start") if he has a very good knowledge of each of the four core modules (Basics of computer use, text processing, table calculations, and Internet). If a student had a very good knowledge of each of the six modules, i.e. of all four basic modules and two from the nine standard modules (Presentations and Use of the database), then he was said to have standard level of IL ("Core").

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The results relating to the students' knowledge of above mentioned six modules (grades 4 and 5 were taken into account) are as presented in Table 4.

χ^2 test of independence showed a significant difference between the study groups and self-assessed knowledge of "Start" module (χ^2 = 6.034, df = 2, p = 0.049 and Cramer's V = 0.144). Medical students assessed their knowledge as better compared to other two study groups.

χ^2 tests of independence (with continuity correction by Yates) showed significant differences: between gender and self-assessed knowledge of "Start" program (χ^2 = 4.805, df = 1, p = 0.028 and fi = -0.14), whereby it was found that male students were more familiar with this program; between high schools and secondary medical schools in relation to self-assessed knowledge "of Start" program (χ^2 = 5.200, df = 1, p = 0.023 and fi = -0.144) in favor of the high school.

School assessment

We used school assessment system for analysis of results following ECDL model. The requirement was that the student obtained minimum grade 2 from each module, (i.e. that he "passed" each module) and at the same time had a very good or excellent final grade from all the modules together (according to self-assessment). In the process of knowledge assessment a student was obliged to have the final grade 4 (whereby he had to have at least one correct answer – i.e. that "he passed" each module).

χ^2 test of independence showed a significant difference between the study group and "Start" program self-assessment (χ^2 = 23.171, df = 2, p = 0.000 and *Cramer's V* = 0.282), as well as between the study group and the "Core" program of knowledge assessment (χ^2 = 15.983, df = 2, p = 0.000 and Cramer's V = 0.234), in favor of students of medicine in both cases.

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χ^2 tests of independence (with Yates' Correction for Continuity) showed significant differences between gender and test-assessed knowledge of "Start" program (χ^2 = 7.836, df = 1; *p* = 0.005 i *fi*=-0.172) in favor of the male students.

Testing prognostic values of certain parameters for IL

Binary logistic regression was conducted to assess the impact of various factors on the possibility that students would have good knowledge of Start programme. The model contained six independent variables (gender, secondary school, mother's education, father's education, monthly income and the age of starting to use computer) and was statistically significant, χ^2 (5, N = 292) = 33.106, p < 0.001. The model explained variances between 14.3% (r2 Cox and Snell) and 19.5% (r2 Nagelkerke) in proven excellent knowledge of Start programme and correctly classified 70.2% of cases.

As shown in Table 5, only two independent variables made a statistically significant contribution to a unique model (gender and secondary school). The strongest predictor of the response that a student had excellent knowledge was completed secondary school with OR = 0.34 (95% CI: 0.18–0.66). This implied that students who completed high school had three times better knowledge than students from secondary medical or other vocational schools (with all other equal factors in the model). Odds ratio for gender was 0.38 (95% CI: 0.20–0.73). Parents' education and income showed no significant association with IL.

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DISCUSSION

The research results showed that not all participants had their personal computer, the reason of which lies in a poor economic situation in the region. This represents a sort of disadvantage because in the contemporary informatics era the computer is indispensable tool in all spheres of life and all professions. Therefore, it is desirable that each individual has a

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personal computer, which would significantly increase computer literacy, improve learning process and general knowledge.

Out of the total number of respondents, 69.5% of them use the computer for Internet access, 24.3% of them for entertainment purposes (playing computer games, watching movies, listening to music, etc.), and only 6,2% of them for data processing programs (MS Word, MS Excel, MS Power Point, etc.). Thus, it could be concluded that only a small number of students use programs for word processing, tabular calculations and making presentations, where no significant differences were found in relation to secondary school completed.

Generally, the students' IL is not satisfactory. Based on the self-assessment, the number of students having an elementary computer literacy according to ECDL standard is 12.33 % of the total number. When testing their knowledge even lower results (only 6.85%) were obtained of basic IL. Only the knowledge of Microsoft Office Word was satisfactory.

It may be possible to explain that those students use it most when it comes to faculty work (writing seminar papers, etc.), while other software tools are rarely in use.

There is a significant difference in the knowledge of all six test modules among students from different study groups indicating that medical students are more competent compared to dental and pharmacy students. Male students have a higher level of literacy in relation to female students. Students who completed high school show better IL compared to those who completed secondary medical (or other vocational school). Students who are satisfied with the knowledge of informatics acquired in secondary school have a significantly higher level of IL compared to those who are not satisfied with the knowledge of informatics acquired in secondary school. Possible explanation should be the difference in the quality of teaching in these schools. Educational background of parents and monthly income had no impact on Informatics literacy. This may be explained by the fact that the development of computer

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literacy takes place predominantly under the influence of the school system, while the influence of the family environment is low.

Unlike IL, students' health literacy relates to their personal background and educational path. There was a positive correlation between health literacy and the educational level of the students' parents. A statistically significant relationship was found between health literacy and type of school, family income, and parents' education level [9, 10].

IL including different program areas was also analyzed by several authors from Serbia. Miletić and Grga [11] examined IL among students of the School of Dental Medicine in Belgrade, but used a questionnaire, which was not made according to the modules of ECDL. Zejnilagić-Hajrić et al. [2] explored IL and the use of computers in the classroom on a sample of students of Chemistry and Physics at the University of Sarajevo, but the methodology of this study was not based on the principles of ECDL. Obradović [12] analyzed IL among doctors and nurses at the Clinical Center of Montenegro. The respondents in his study had ECDL certificate.

A few authors from different parts of the world who dealt with IL, computer skills and different aspects of computer use among various groups of subjects had results similar to ours [13–17]. In 1993, Debehnke and Valley [18] examined the IL of Emergency medicine students by means of a questionnaire which consisted of questions related to self-assessment of knowledge of particular application programs and computer skills. Bediang et al. [19] examined the IL and e-learning of students and lecturers at the departments of Medicine, Dentistry and Pharmacy at an African university. Ranasinghe et al. [20] examined the IL of first year medical students at the University of Sri Lanka, and they found that the most important predictor for computer literacy is previous IT training.

There are findings also similar to ours in some previous studies [21–24]. There has also been a large number of studies on IL of nurses and technicians [25–28]. Nevertheless,

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biomedical students are not expert computer users. Despite an upbringing in a digitized world, many students still lack some basic computing skills [29, 30]. Recent surveys in different countries have also declared that biomedical sciences students' informatics literacy was unsatisfactory [31, 32, 33]. IL skills have become a necessity and an integral part of preparing tomorrow's doctors to be sufficiently competent to use informatics resources effectively and efficiently for the best practice of biomedical sciences [34, 35].

The goal of all education systems is to improve the learning process, and educators need to know the educational strategies, methods and procedures, as well as the ways in which students learn. New technological developments are reflected directly in the educational system, and the way of their application and implementation depends on informatics and communication technologies [23, 36]. As the communication technologies are inevitable in all spheres of life and work, all students should be well prepared to apply informatics technologies in the future workplace.

The current state of equipment and practical instruction of Informatics module at the Faculty of Medicine in Niš

In 2010, the computer network of the Faculty of Medicine had about 350 computers located at institutes, amphitheaters, and classrooms. In this way, teachers and teaching associates could perform teaching in a more modern way, and have an access to numerous specialized databases. At that point, the Computer Centre was an integral part of a worldwide network and with its communication, equipment completely satisfied European standards. Considering that average life span of computers is five years, computers at the Faculty of Medicine no longer represent adequate equipment for practical training of students. Due to low RAM memory, they cannot support new versions of operating systems and more

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demanding programs cannot be carried out at necessary speed. All the above-mentioned facts indicate that it is not possible to carry out instruction at a satisfactory level.

CONCLUSIONS

Generally, students' elementary informatics literacy is not satisfactory. Medical students are more competent, compared to dental and pharmacy students, and male students have a higher level of literacy than female ones. Students who completed high school show better informatics literacy compared to those who completed specialized schools. Educational background of parents and monthly income had no impact on IL.

Proposed measures

It is necessary to modify the curriculum and syllabus of Informatics course and make it compatible with practical work in computer classroom, as well as to include new modules in the curriculum along with the modernization of computer equipment at the Faculty (as well as in high schools). In addition, the curriculum of Informatics course should be adjusted to European standards - ECDL program with the introduction of the elective or compulsory Informatics course for all study groups.

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ACKNOWLEDGMENT

This work was supported by the Ministry of Science and Technological Development of the Republic of Serbia (Project 43012 and 41018).

Conflict of interest: None declared.

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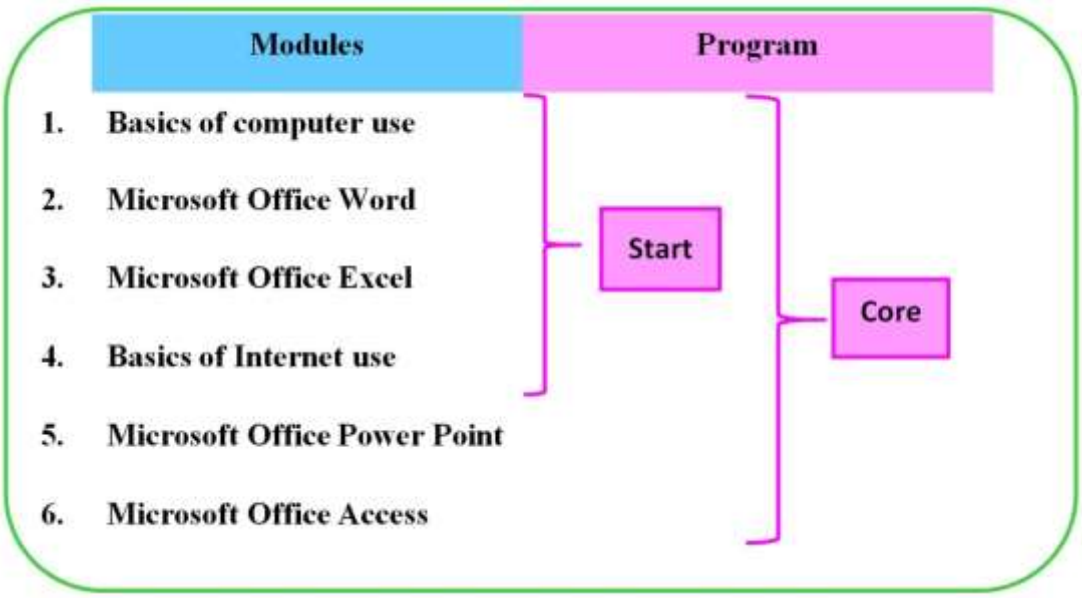

Figure 1. Modules "Start" and "Core"

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Table 1. General overview of respondents

	Gender		**Secondary school**		**Satisfied with their knowledge from secondary school**		**Total**
Study group	Male	Female	High school	Secondary medical school	Yes	No	
Medicine							
Number	56	126	73	109	90	92	182
%	30,8%	69,2%	40,1%	59,9%	49,5%	50,5%	100,0%
Dentistry							
Number	16	28	9	35	23	21	44
%	36,4%	63,6%	20,5%	79,5%	52,3%	47,7%	100,0%
Pharmacy							
Number	16	50	26	40	25	41	66
%	24,2%	75,8%	39,4%	60,6%	37,9%	62,1%	100,0%
Total							
Number	88	204	108	184	138	154	292
%	30,1%	69,9%	37,0%	63,0%	47,3%	52,7%	100,0%

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Table 2. Informatics literacy of students in relation to modules

SELF-ASSESSMENT OF KNOWLEDGE					ASSESSMENT OF KNOWLEDGE (test)			
Not enough	Enough	Good	Very good	Excellent	No knowledge	Poor knowledge	Average knowledge	Very good knowledge
Basics of computer use								
46	95	82	50	19	6	44	130	112
15.8%	32.5%	28.1%	17.1%	6.5%	2.1%	15.1%	44.5%	38.4%
Microsoft Office Word								
16	70	86	75	45	17	55	89	131
5.5%	24.0%	29.5%	25.7%	15.4%	5.8%	18.8%	30.5%	44.9%
Microsoft Office Excel								
56	80	91	49	16	59	97	84	52
19.2%	27.4%	31.2%	16.8%	5.5%	20.2%	33.2%	28.8%	17.8%
Microsoft Office Power Point								
21	59	79	82	51	10	39	98	145
7.2%	20.2%	27.1%	28.1%	17.5%	3.4%	13.4%	33.6%	49.7%
Microsoft Office Access								
122	82	59	21	8	156	89	36	11
41.8%	28.1%	20.2%	7.2%	2.7%	53.4%	30.5%	12.3%	3.8%
Internet								
3	28	72	92	97	14	43	86	149
1.0%	9.6%	24.7%	31.5%	33.2%	4.8%	14.7%	29.5%	51.0%

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Table 3. Correlation between self-assessed and assessed (by test) knowledge of modules

Self-assessment of knowledge	Assessment of knowledge (test)
	Spearman's rho
Basics of computer use	0.331**
Word	0.406**
Excel	0.283**
Power Point	0.435**
Acces	0.348**
Internet	0.320**

** $p < 0.001$

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Table 4. Start and Core IL according to ECDL standards in relation to study group, gender and completed secondary school – traditional and school scoring

	START				CORE			
	Self-assessment		Assessment (test)		Self-assessment		Assessment (test)	
TRADITIONAL GRADING								
Faculty								
Medicine	29	15.93%	17	9.34%	14	7.69%	2	1.1%
Dentistry	2	4.54%	1	2.72%	1	2.72%	0	0%
Pharmacy	5	7.57%	2	3.03%	2	3.03%	0	0%
Gender								
Male	17	19.32%	10	11.36%	9	10.23%	0	0%
Female	19	9.31%	10	4.90%	8	3.92%	2	0.98%
Secondary school								
High school	20	18.52%	10	9.26%	8	7.41%	2	1.85%
Secondary medical school	16	8.70%	10	5.43%	9	4.89%	0	0%
Total	36	**12.33%**	20	**6.85%**	17	**5.82%**	2	**0.68%**
SCHOOL GRADING								
Faculty								
Medicine	74	40.66%	84	46.15%	52	28.57%	40	21.98%
Dentistry	14	31.82%	13	29.55%	11	25%	2	4.55%
Pharmacy	19	28.79%	9	13.64%	11	16.67%	3	4.55%
Gender								
Male	39	44.32%	43	48.86%	22	25%	19	21.59%
Female	68	33.33%	63	30.88%	52	25.49%	26	12.75%
Secondary school								
High school	60	55.56%	57	52.78%	39	36.11%	28	25.93%
Secondary medical school	47	25.54%	49	26.63%	35	19.02%	17	9.24%
Total	107	**36.64%**	106	**36.30%**	74	**25.34%**	45	**15.41%**

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Table 5. Probability prediction of certain parameters for ECDL Start programme – test-assessment by school grading system

Parameters	B	Stand. error	Wald	df	*p*	OR	95% CI for EXP(B)	
							Lower	Upper
Gender	-0.964	0.335	8.294	1	0.004	0.381	0.198	0.735
Secondary school	-1.078	0.336	10.278	1	0.001	0.340	0.176	0.658
Educational background of a mother	0.135	0.172	0.621	1	0.431	1.145	0.818	1.602
Educational background of a father	0.151	0.180	0.708	1	0.400	1.163	0.818	1.654
Monthly income	0.000	0.000	0.081	1	0.776	1.000	1.000	1.000
The start year of computer use	-0.012	0.065	0.034	1	0.854	0.988	0.870	1.123
Constant	-0.073	0.884	0.007	1	0.934	0.930		

Hosmer and Lemeshow Test: $\chi^2 = 4.078$, df=8, p=0.850 (>0.05)

B – coefficient for the constant ("intercept") in the null model; OR – odds ratio; Wald – Wald χ^2 test; Exp(B) – exponentiation of the B coefficient (odds ratio); df – the degrees of freedom for each variable

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Appendix 1 – STANDARD MODULES

Standard modules represent a set of practical skills used in each of the corresponding areas chosen by candidates themselves according to their needs at work. There are nine standard modules, and by taking combined examination version with basic modules ECDL. Core or ECDL Profile sertificate could be obtained. Standard modules include:

1. Presentations – Formation of professional standard presentation. Creation, formatting, modification and preparation of presentations using different slides for demonstration and distribution.

2. Use of data base – Efficient use of desktop data base, understanding basic concept of data base and demonstrating the ability of using data base application by creating and modifying tables, inquiries forms, reports and preparing them for distribution. Connecting tables, uploading and manipulating information from data base using inquiries and sorting tools.

3. IT safety – Ensuring personal and organization data safety, secure use of online services including the use of social networks.

4. Online collaboration – Developing concepts and skills relating to adjustment and use of online collaboration tools,social media, webinars, mobile technology and cloud computing.

5. Image processing – Acquisition of skills and competences relating to different programmes for image processing.

6. Web site processing – Understanding basic concepts of web site processing and publishing, design, creation, installation and maintenance of static web page.

7. Project planning – Using project management software. A candidate will be able to prepare a project plan, monitor projects, organize time, costs and tasks.

8. 2D Computer Aided Design – Acquisition of skills for creating and modifying objects or elements in a two-dimension design. Getting acquainted with changing properties, objects, preparation for printing or plotting.

9. Use of health information system – Designed for doctors, nurses, as well as the complete doctor’s team caring about patients.

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Appendix 2 – QUESTIONNAIRE

1) What is your study group ?

a) Medicine **b)**Dentistry **c)**Pharmacy

2) Gender

a) Male **b)**Female

3) What secondary school did you complete?

_____

4) Are you satisfied with the Informatics knowledge acquired in secondary school?

a) Yes **b)**

b) No

5) What are your parents' qualifications?

Mother:	Father:
a) Elementary school	**a)** Elementary school
b) Secondary school	**b)** Secondary school
c) College	**c)** College
d) University	**d)** Univeristy
e) Master/doctoral degree	**e)** Master/doctoral degree

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6) What is the total monthly income of your household (rougly)?_____

7) How many members are there in your family?_____

8) Do you have a computer at home or at temporary residence?

a) Yes (circle the type of computer – more than one answer possible

i) Desktop computer **ii)**Laptop **iii)**Tablet

b) No

9) How many computers are there in your household?_____

10) How old were you when you started using a computer?_____

11) What is the purpose for which you use a computer?

a) Entertainment (playing games, watching movies ,...)

b) Internet use

c) Data processing using (Word, Excel, Power Point,...)

---

12) How would you assess your knowledge of operation system?

a) Not enough **b)**Enough **c)**Good **d)**Very good **e)**Excellent

13) How would you asses your knowledge of Microsoft Office Word?

a) Not enough **b)**Enough **c)**Good **d)**Very good **e)** Excellent

14) How would you assess your knowledge of Microsoft Office Excel?

a) Not enough **b)**Enough **c)**Good **d)**Very good **e)** Excellent

15) How would you assess your knowledge of Microsoft Office Power Point?

a) Not enough **b)**Enough **c)**Good **d)**Very good **e)**Excellent

16) How would you assess your knowledge of Microsoft Office Access?

a) Not enough **b)**Enough **c)**Good **d)**Very good **e)**Excellent

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17) How would you assess your knowledge of Internet?

a) Not enough **b)**Enough **c)**Good **d)**Very good **e)**Excellent

---

18) File with .docx (.doc) extension represents:

a) database **b)**compressed file; **c)**text documentt; **d)**I do not know.

19) File with .xlsx (.xls) extension represents:

a) table; **b)** presentation; **c)** web document; **d)** I don't know.

20) File with .pptx (.ppt) extension represents a:

a) text document; **b)**video file; **c)**presentation; d)I don't know

21) File with .accdb (.mdb) extension is :

a) video file; **b)**executable file; **c)**database; d)I don't know.

22) Which of the following belongs to computer operation system?

a) Avast **b)**Windows 7 **c)**WinZip **d)**I don't know

23) Is it possible to search a document in Word using a key word?

a) Yes **b)**No **c)**I don't know

24) Can functions in Excel may be applied to numerical data?

a) Yes **b)**No **c)**I don't know

25) While printing a presentation is it possible to print several slides on one piece of paper?

a) Yes **b)**No **c)**I don't know

26) Is it possible to copy table from Excel to Word dokument?

a) Yes **b)**No **c)**I don't know

27) Is it possible to insert both text and image on the same slide in Power Point presentation?

a) Yes **b)**No **c)**I don't know

28) In an email address petar10@gmail.com, petar10 represent:

a) password; b)user name; **c)**domain; **d**)I don't know .

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29) Which programme opens a pdf file ?

a) Windows Media Player **b)**Adobe Reader

b) Kaspersky AVP **d)**I don't know

30) Page numebring in Word:

a) cannot be inserted ;

b) can be inserted only at the top of page ;

c) can be inserted only at the bottom of the page ;

d) can be inserted both at the top and bottom of page ;

e) I don't know

31) Data sorting in a table created in Access is possible:

a) only using one criteriom; **b)**using several criteria;

c) only in increasing order; **d**)I don't know.

32) The function of Outlook Express programme is :

a) creating Web presentations; **b)**Internet access;

c) receiving and sending e mails; **d)**I don't know.

33) Which statement is correct ?

a) Operation system provides computer protection from viruses.

b) Operation system represents a sum of all programmes on a computer.

c) Operation system is necessary for the use of programmes and files.

d) I don't know.

34) One table in Access may have:

a) only one primary key; **b)**multiple primary keys;

c) maximum two primary keys; **d)**I don't know.

35) Modem is:

a) an electronic device enabling Internet access;

b) operation system of a computer by means of which we get connected to Internet;

c) programme enabling Internet access;

d) I don't know.

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