




**PQ**pharm

Postgraduate Qualification in Pharmacy:  
The Way Forward



European Commission  
**TEMPUS**

PQPharm Report   
Situational Analysis and the Need for Change

Report 1

# *PQPharm Report*

## *Situational Analysis and the Need for Change*

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## Introduction

Pharmacy Education in Serbia has a 70 years of tradition, since the Pharmacy Department was founded at the Medical Faculty, University of Belgrade in 1939. The independent Faculty of Pharmacy was established in 1945. It was the first and, until 2000, the only Pharmacy Higher Education Institution in Serbia. Postgraduate Specialization Courses in the Pharmaceutical Sector in Serbia are well established and the degrees recognized, similarly to that in Medical Education. The first Postgraduate Specialization courses were introduced at the Faculty of Pharmacy, University of Belgrade in 1955. The total number of pharmacy graduates from the University of Belgrade approximates 9922 and the number of candidates with the specialization degree in pharmacy is 1275.

Following the signing of the Bologna Declaration in 2003, Serbia officially joined other European countries in this Trans-European process aiming at the creation of a European Space in Higher Education by the year 2010. Serbian Universities have been involved in major curriculum reform during the last six years. The reforms towards the Bologna process have been implemented on both the undergraduate and post-graduate PhD level. The first generation of students studying according to the reformed curricula are now in the fourth year of a five-year integrated study program. During that time, continuous

monitoring of teaching/learning and assessment is performed and the necessary adjustments are being made. On the other hand, there is a rising concern from both the faculty members, as well as the pharmaceutical profession at large, regarding quality improvement of Postgraduate Qualification Curricula and the potential ways to meet the requirements for Continual Professional Development and Life Long Learning. Such demands are in line with the globally recognized issues in Postgraduate Pharmacy Education:

“The development of the pharmaceutical field calls for further education and specialization beyond the master level. In Europe there are as many ways to pursue this challenge as there are national states. In the Bologna framework the PhD degree is the only formal framework for postgraduate education (third cycle). The educational needs for pharmacists to be able to practice as specialists in various fields do not always fit into the PhD format and expectations. We have a need for a more diversified tool-box.”

*(preface to the 2009 Annual Conference of the European Association of Faculties of Pharmacy).*

## **Pharmacy Postgraduate Qualification in Serbia**

### **Higher Education Institutions**

There are four Higher Education Institutions (HEI) delivering undergraduate pharmacy courses:

- (i) Faculty of Pharmacy, University of Belgrade,
- (ii) Department of Pharmacy, Medical Faculty, University of Novi Sad,
- (iii) Department of Pharmacy, Medical Faculty, University of Niš and
- (iv) Department of Pharmacy, Medical Faculty, University of Kragujevac.

The Faculty offers educational programmes for pharmacists on the undergraduate and postgraduate level and with its 167 academic staff, provides a nurturing and challenging learning environment delivering two integrated (5 years) undergraduate study programs: Master of Pharmacy and Master of Pharmacy - Medical Biochemist. The number of first-year students entering the Master of Pharmacy study program is 275 per year, whereas the Master of Pharmacy - Medical Biochemist Program enrolls 50 first year students. A number of 40 students per year are enrolled in the postgraduate PhD program, while an additional 100 students per year are enrolled in the different postgraduate qualification/specialization courses. The Faculty of Pharmacy educates pharmacists for community and hospital

pharmacy settings, pharmaceutical industry, wholesales, laboratories of drug and food analysis and control and biochemical laboratories. In 2004 the Center for Continuing Education was formed at the Faculty of Pharmacy, being committed to providing continuing professional development for pharmacists in Serbia. Besides, the Faculty of Pharmacy and its staff are actively involved in all professional activities in the pharmaceutical sector in Serbia, collaborating with the Pharmaceutical Chamber of Serbia, Chamber of Biochemists of Serbia, Society of Medical Biochemists of Serbia and Pharmaceutical Society of Serbia. The Faculty of Pharmacy, University of Belgrade has its representatives on the National Pharmacy Experts Committee and the National Health Board, which takes responsibility for the continuing professional development/education courses and course provider's accreditation. In addition to its long membership of the International Pharmaceutical Federation, the Faculty of Pharmacy became a member of the European Association of Faculties of Pharmacy in 2002.

The Department of Pharmacy was established at the Medical Faculty, University of Novi Sad in 2000. The Master of Pharmacy course is delivered as a 5-years study program in both Serbian and English language. The number of students entering the Master of

Pharmacy course is 80 per year. The Faculty has a tradition of Postgraduate PhD studies and actively contribute to continuing education and lifelong learning. There is an interest for development of postgraduate specialization courses dedicated to pharmacy professionals.

The Department of Pharmacy at the Medical Faculty, University of Niš, was established in 2002. The total number of students currently involved in the Department of Pharmacy is 440. There are over 140 academic staff engaged in the Pharmacy Curriculum. In 2007, postgraduate PhD studies were established at the Faculty. There is an interest in development of postgraduate qualification courses in Clinical pharmacy, Phytotherapy and dietetics.

The Department of Pharmacy at the Medical Faculty, University of Kragujevac, was founded in 2005. There is one study programme at the Department, the Master of Pharmacy course, with duration of 5 years (10 semesters). The annual enrolment rate on the programme is 84 students. There are 140 academic staff members engaged at the Department (81 lecturer or professor and 59 assistants). Postgraduate courses are not currently organized by the Department.

## **Legal Framework**

Professional and educational activities within the Pharmaceutical Sector in Serbia are regulated by the Law on Health Care (issued in 2005); Law on Medicines and Medical Devices (2005); Law on Higher Education (2005) and a number of Regulations and Guidelines<sup>1</sup>. In line with the above regulations, certain professional positions require a specialization degree from a relevant study programme. According to the National Regulation on Drug Manufacture (2008) the Specialization Degree in Drug Analysis and Quality Control is required for a Quality Control Manager position; A Specialization Degree in Pharmaceutical Technology or Industrial Pharmacy is a prerequisite for Drug Production Manager. The importance of postgraduate qualification and professional development of healthcare professionals has been acknowledged by the National Law on Health Care (2005). Both Professional Specialization /subspecialization study programmes, as well as Continuing Education are recognized as the "Right & Duty" of healthcare professionals. Furthermore, it is stated that the expenses of postgraduate qualification should be the responsibility of the employer.

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<sup>1</sup> *The new Law on Medicines and Medical Devices, as well as the Law on Higher Education are currently under review in the National Assembly.*

## Specialization Studies

Postgraduate specialization courses in Pharmacy have been, traditionally, endorsed by the Ministry of Health and the Curricula published in the relevant regulatory document. To enter the study programme, candidates should obtain the approval from the Ministry of Health. Employment in relevant institutions as well as work experience are prerequisites for course admission. Courses are offered to pharmacy graduates and, some of them, also to other professionals working in the pharmaceutical sector.

There are currently eight specialization degree courses offered by the Faculty of Pharmacy, University of Belgrade:

- (i) Medical Biochemistry,
- (ii) Pharmaceutical Technology,
- (iii) Drug Analysis and Quality Control, (iv) Pharmacotherapy,
- (v) Clinical Pharmacy,
- (vi) Quality Control and Use of Medicinal Plants,
- (vii) Sanitary Chemistry and
- (viii) Toxicological Chemistry.

The new study programme of Professional Specialization in Social Pharmacy has been submitted to the Ministry of Health for approval. An important feature of these professional specialization study programmes, is internship/work placement in the relevant institutions such as Community Pharmacies, Hospital Pharmacies,

Clinical Centers, Drug Agency and/or within the Pharmaceutical Industry.

More recently, so called 'academic specialization courses' have been introduced and recognized by the Law on Higher Education. These study programmes were accredited by the Ministry of Education as the 60 or 90 ECTS taught courses (i.e. 12 or 18 months duration, respectively) and are available to pharmacy and non-pharmacy graduates regardless of their work experience and/or employment.

Currently offered courses include:

- (i) Pharmaceutical Management and Marketing,
- (ii) Pharmacoeconomics and Pharmaceutical Legislation,
- (iii) Pharmaceutical Care,
- (iv) Industrial Pharmacy and
- (v) Cosmetology.

More detailed information on the particular Study Programmes are given in the Appendix 1 attached to this Report.



Two types of postgraduate specialization study programmes are available:

- ❑ **Professional Specialization Courses**  
endorsed by the Ministry of Health; 2-4 year courses with a practical/work placement in relevant pharmaceutical institutions; the admission prerequisites are employment in a relevant professional institution, work experience and approval obtained from the Ministry of Health;
- ❑ **Academic Specialization Courses**  
accredited by the Ministry of Education; 1-1.5 years taught courses available to pharmacy and non-pharmacy graduates irrespective of the employment status and/or work experience.

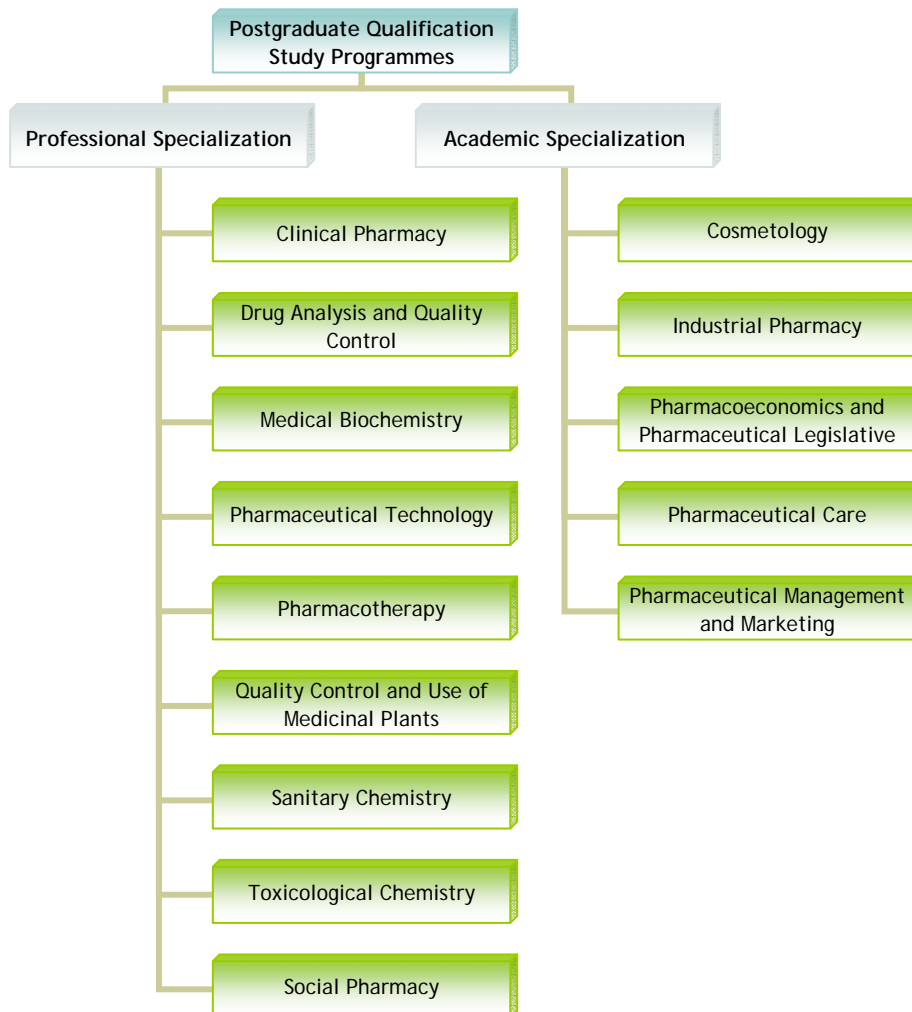


Figure 1. Postgraduate Specializations in Pharmacy (at the Faculty of Pharmacy, University of Belgrade)

A summary of the data on the number of students admitted/graduated on the individual study programmes per year, for the period 1996-2009 (for the Professional Specializations) and 2003-2009 (for the Academic Specializations) is given in Table 1 and in Figures 2-5.

Table 1. Number of students admitted/graduated from the postgraduate specialization courses at the Faculty of Pharmacy, University of Belgrade (summary of the data 1996-2009)

<b>Study program</b>	<b>admitted</b>	<b>graduated</b>
<b>Professional Specialization Courses (1996 – 2009)</b>		
Medical Biochemistry	84	74
Drug Analysis and Quality Control	72	49
Pharmaceutical Technology	97	83
Pharmacotherapy	72	46
Clinical Pharmacy	14	3
Quality Control and use of Medicinal Plants	8	3
Sanitary Chemistry	49	49
Toxicological Chemistry	32	27
<b>Sub-total</b>	<b>428</b>	<b>334</b>
<b>Academic Specialization Courses (2003 – 2009)</b>		
Pharmacoeconomics and Pharmaceutical Legislation	240	159
Pharmaceutical Management and Marketing	146	51
Industrial Pharmacy	100	21
Pharmaceutical Care	162	146
Cosmetology	56	13
<b>Sub-total</b>	<b>704</b>	<b>390</b>
<b>Total</b>	<b>1132</b>	<b>724</b>

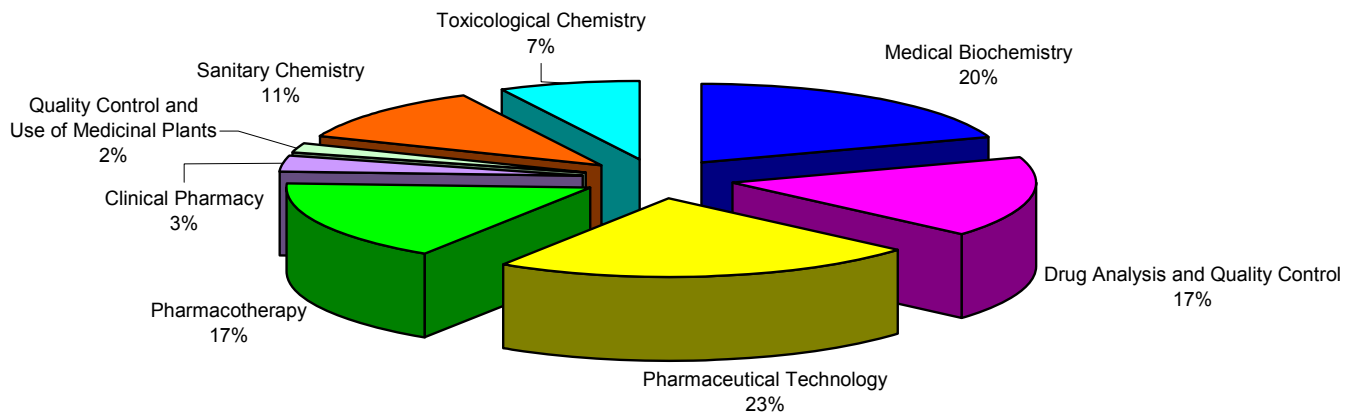


Figure 2. Percentage of students entering different Professional Specialization Study Programmes (summary of data 1996-2009)

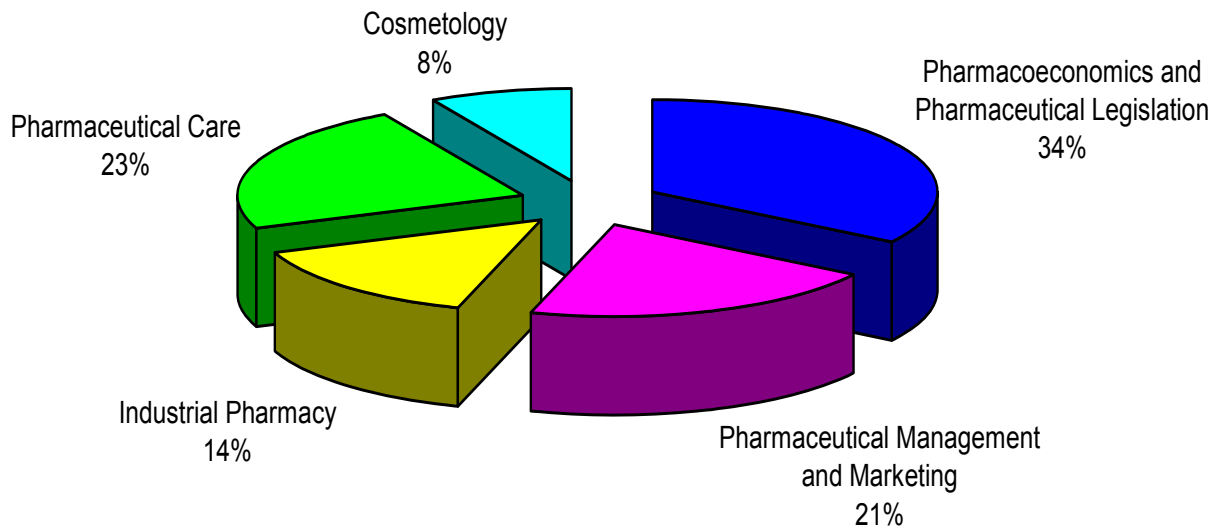


Figure 3. Percentage of students entering different Academic Specialization Study Programmes (summary of data 2003-2009)

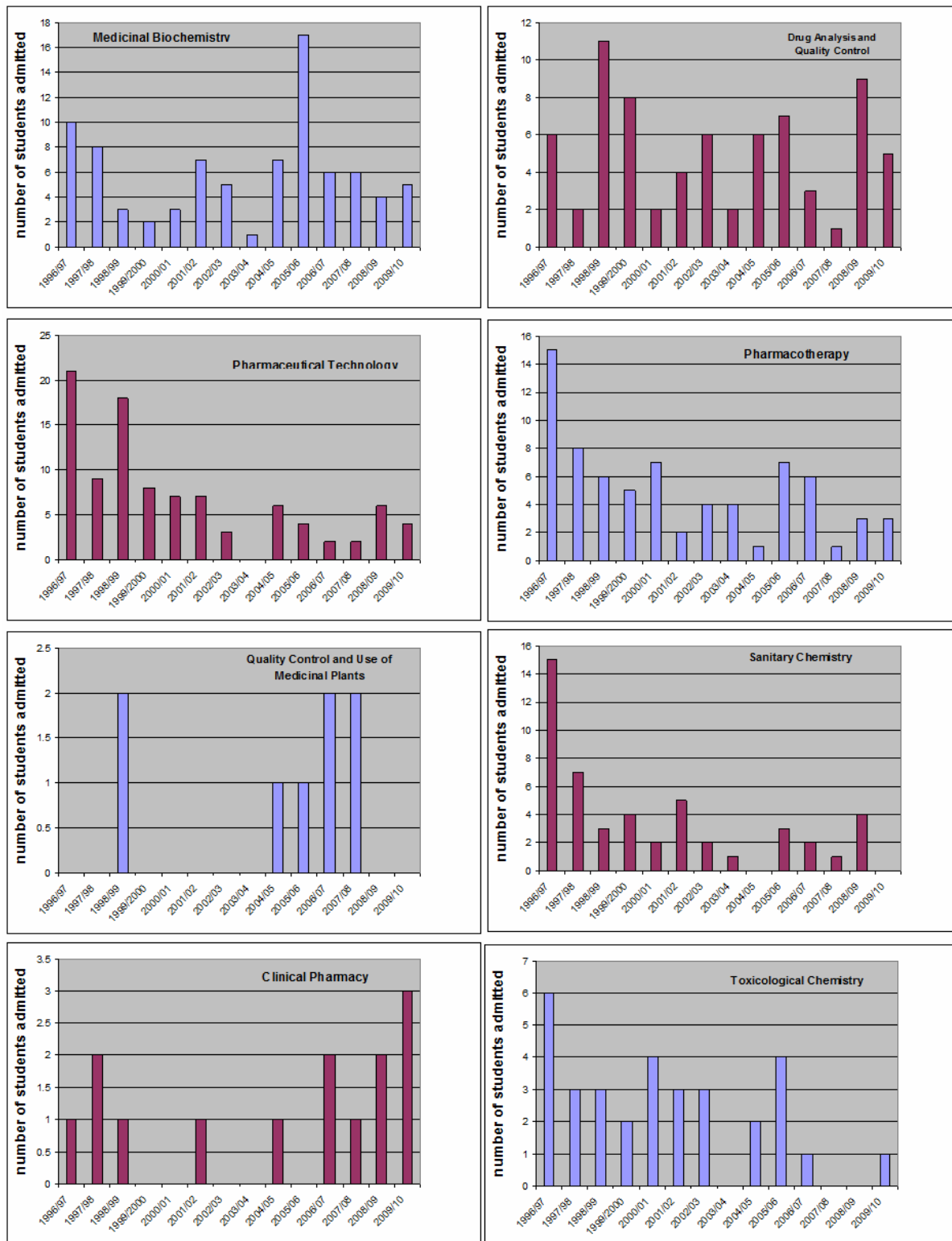


Figure 4. Number of students admitted per study course per year (Professional Specialization - summary of data 1996-2009)

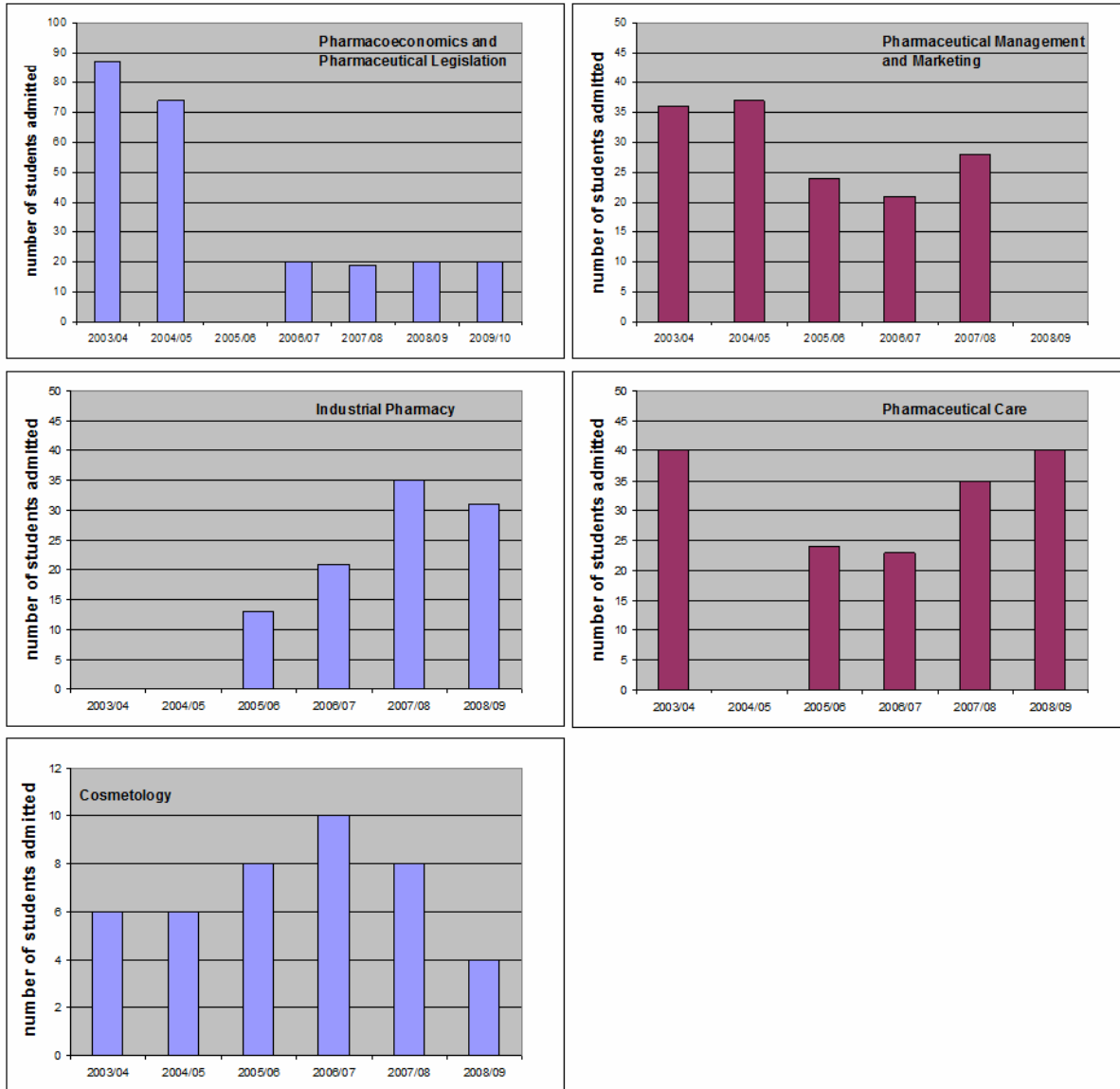


Figure 5. Number of students admitted per study course per year (Academic Specialization - summary of data 2003-2009)

A summary of the data on the total number of students admitted/graduated on all study programmes per year, for the period 1996-2009 (for the Professional Specializations) and 2003-2009 (for the Academic Specializations) is given in Figures 6 and 7.

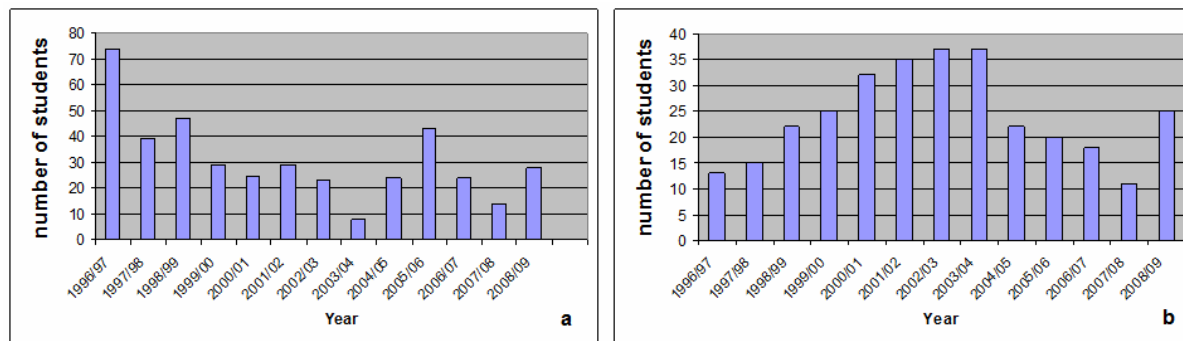


Figure 6. Total number of students (a) admitted and (b) graduated from Professional Specialization study programmes (summary of data 1996-2009)

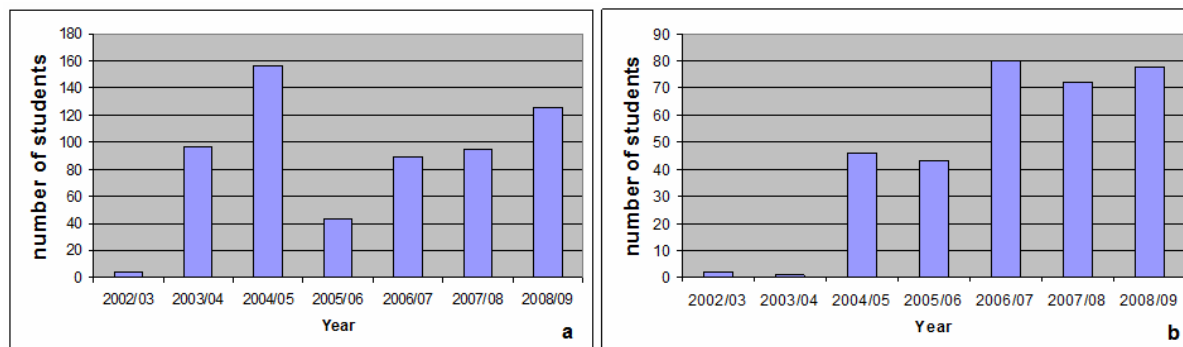


Figure 7. Total number of students (a) admitted and (b) graduated from Academic Specialization study programmes (summary of data 2003-2009)

Relatively high variability in the number of students entering the Professional Specialization study programmes may be observed reflecting the fact that candidates admission has to be endorsed by the employing institution and approved by the Ministry of Health. On the contrary, the number of students entering Academic Specialization study programmes is relatively steady, with a peak in the number of students entering the study course immediately after the

course introduction, and a subsequent leveling off.

There is a great interest among pharmacy professionals in these types of postgraduate education programs, and the number of candidates entering different postgraduate qualification programs reached a 154 students in the school year 2008/09. The results of a recent survey indicate that the main objective of recent graduates to enter

some of the postgraduate qualification programs is to improve their employability, while more experienced professionals are looking for further professional development and/or to meet the specific job/position requirements. Although the majority of respondents replied that course contents were in accordance with their expectations, they also suggested the introduction of new topics as a mean of curriculum improvement. It is interesting that more than 40% of the respondents

were also engaged with some other postgraduate studies, such as other specialization courses (25%), MSc (11%) or PhD (13%). Most of the respondents indicated that new methods of teaching and learning, particularly Problem Based Learning should be introduced, and emphasized the lack of educational resources in Serbian as one the major drawbacks (see Appendix 2 for details).

### **Quality Assurance**

Internal Quality Assurance related to the development and delivery of postgraduate specialization curricula at the Faculty of Pharmacy, University of Belgrade is continuously monitored by the Committee for Postgraduate Specialization Studies. The Committee's responsibility is to assure that relevant academic standards are met and to propose quality enhancement activities. Student Satisfaction Questionnaires are regularly distributed to students at the end of individual courses.

For the purpose of the PQPharm Project Situational Analysis, the Course Experience Questionnaire was designed and distributed to the postgraduate specialization course graduates. The main aspects assessed were defined in accordance with the general recommendations for quality assurance

in higher education. They were related to the (i) Curriculum Design, Content and Organization; (ii) Teaching, Learning and Assessment; (iii) Student Progression and Achievement; (iv) Student Support and Guidance; (v) Learning Resources and (vi) Quality Assurance and Enhancement. A total of 149 completed Questionnaires was received and evaluated. The results obtained indicate that the majority of candidates with postgraduate specialization diploma, graduated more than 15 years ago (especially those who had been involved in the Professional Specialization Courses), while the number of recent graduates is higher on the Academic Specialization Courses. Such a situation is in accordance with different admission conditions for the two types of study programs.

The Questionnaire, responses obtained and the relevant statistics are given in the Appendix 2 of this Report.

External Quality Assurance is provided by the Ministry of Health and Ministry of Education by the approval/ accreditation of the study programs. The evaluation of the Continuing Education Programmes is conducted by the National Health Council.

### **Continuing Education**

The Centre for Continuing Education was established at the Faculty of Pharmacy, University of Belgrade in 2004. Starting from 2005, the organization of one- or two-days courses was initiated with an emphasis on topics related to healthcare services. Those activities are interconnected with the pharmacists licensure system which was introduced in 2008 as obligatory for the pharmacists working in the community and hospital pharmacies. According to the Regulation on licensure renewal for healthcare professionals (2008), a pharmacist has to participate in continuing education activities in order to obtain the number of 168 credits over a seven year period (i.e. 24 credits per year).

There is a number of institutions nominated to organize and deliver Continuing education courses among

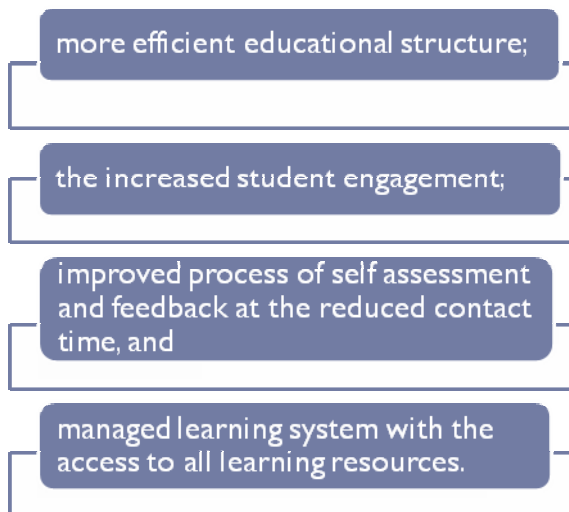
which are the Centre for Continuing Education (Faculty of Pharmacy), the Pharmaceutical Society of Serbia and other professional institutions and associations. The Continuing Education Courses have to be submitted for accreditation by the National Health Council.

### **E-Learning, the current status**

Although the need for e-education development has been recognized by the 'National Strategy for an Information Society' (<http://www.wbc-inco.net/object/document/1387.html>) the 'Law of Higher Education', the Ministry of Education and its e-learning Task Force Group, the application of network technologies in teaching and learning is in its initial phase in the Republic of Serbia (RS) Universities.

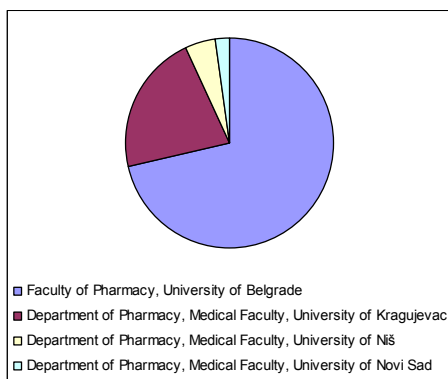
Therefore, there is a need to create a learning management platform which will integrate traditional teaching with e-learning (EL) technologies such as Web-based courseware, on-line discussion groups, live virtual classes, video and audio streaming, web chat, on-line simulations and virtual mentoring.

Such an e-learning platform will result in:



In order to establish a wider extent of application of EL methodologies in teaching at the Faculty of Pharmacy, University of Belgrade and the Pharmacy Departments on the University of Nis, Kragujevac and Novi Sad, a questionnaire was prepared and circulated among the teaching staff. The questionnaire itself was designed to provide a general information rather than deeper insight into the EL application at each institution. This report summarises information on current status of EL at the above Faculties and is based on responses to the Questionnaire.

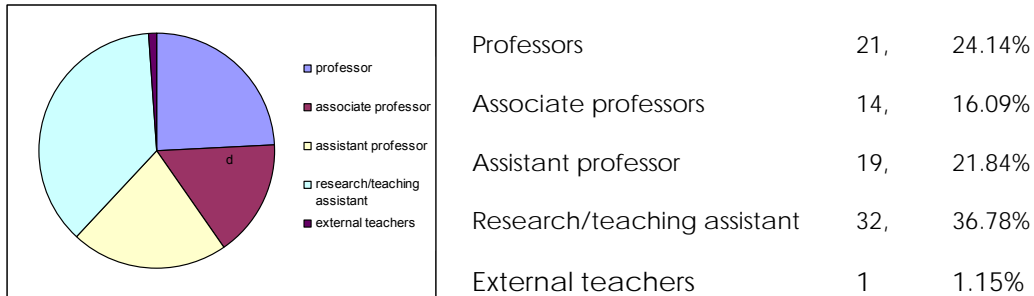
The questionnaire was completed by 87 members of teaching staff at the RS Universities. The number of respondents from the individual institutions is illustrated in **Figure 8**.



Faculty of Pharmacy, University of Belgrade	62,	71.26%
Department of Pharmacy, Medical Faculty, University of Kragujevac	19,	21.84%
Department of Pharmacy, Medical Faculty, University of Nis	4,	4.60%
Department of Pharmacy, Medical Faculty, University of Novi Sad	2,	2.30%

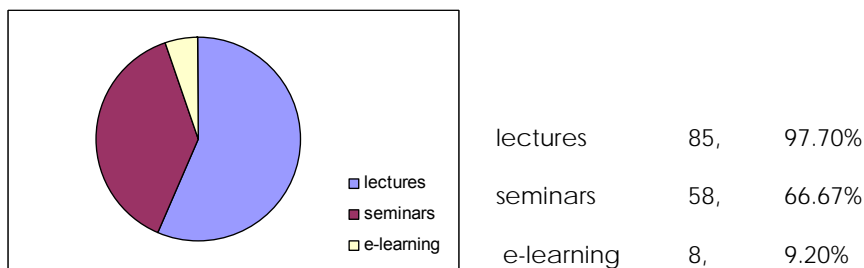
**Figure 8.** Number of respondents from the RS faculties

The majority of respondents were teaching/research assistants and assistant professors (58.62%), **Figure 9**. That may lead to the conclusion that the majority of those taking part in this survey are younger personnel.



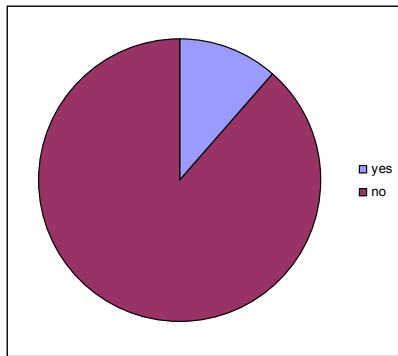
**Figure 9.** The respondents profile

The question related to teaching methods may illustrate the current position of e-learning in relation to the classical teaching methods at the above faculties. Generally, only 9.2% teachers involved in the survey combine lecturing or seminars and various EL methods, while the majority relies on a classical teaching approach (**Figure 10**).



**Figure 10.** Teaching methods employed

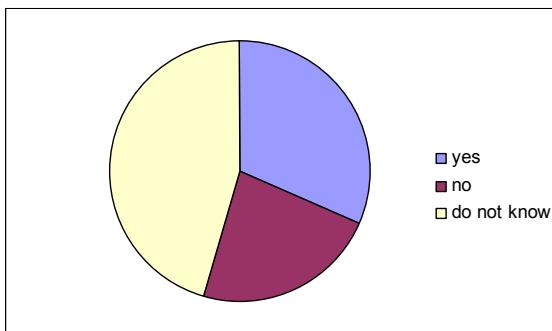
The above result is supported fully by the answers related to the question on application of EL, showing a low level of wider use of this methodology in teaching (**Figure 11**). Most of the respondents (88.51%) do not use EL (this does not include the use of Power Point presentation in lecturing). Participants in this survey were also asked about their plan to use e-learning in the next academic year. There is slight increase in the number of people currently using it and those who plan to continue and to start exploring the potential of EL, but the majority (62.27%) does not use or intend to start using EL (**Figure 12**). It is interesting that 41.38% respondents are not sure about their use of EL in the next academic year. This may reflect various constraints related to the wider use of EL at present such as infrastructural requirement, not being well informed on EL methodologies or hesitation to implement new technologies.



Yes	10,	11.49%
No	77,	88.51%

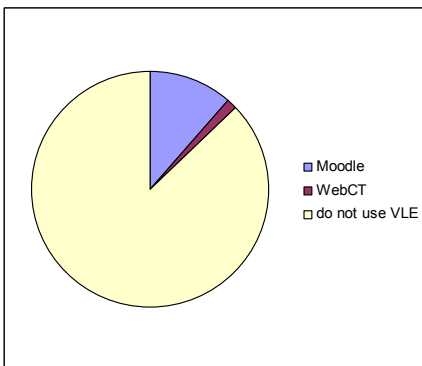
**Figure 11.** The use of e-learning

The question relating to a Virtual Learning Environment (VLE) shows that the *Moodle* software is almost exclusively used as VLE platform (**Figure 13**). The final question was related to the personal opinion on usefulness of EL as a teaching/learning method (**Figure 14**). Most of the respondents (71.26%) agreed that it may contribute to creating a better teaching/learning environment, although a significant number of participants (26.44%) do not seem to know enough about EL to evaluate its potential.

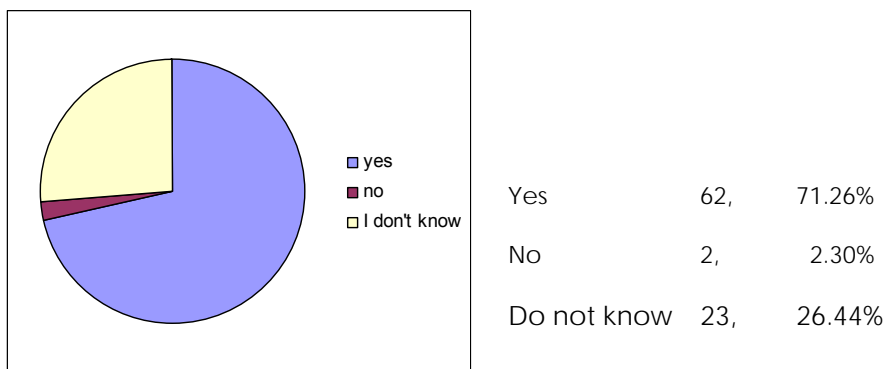


Yes	25,	28.74%
No	18,	20.69%
Do not know	36	41.38%

**Figure 12.** The intention to use e-learning in 2010/2011 academic year



**Figure 13.** Virtual learning environment employed



**Figure 14.** EL contribution in creating better teaching/learning environment

This brief survey enabled the establishment of the general position of EL as a teaching method at the above faculties. It is reasonable to say that EL is inadequately used and that there is opportunity for further expansion in order to create a better and more efficient teaching/learning environment. In addition, the survey suggested that there is a lack of awareness about EL potential, but at the same time, a belief that EL, as integral part of teaching/learning process, may contribute to creating a better professional environment for both students and teachers.

### ***Harmonization with the EU***

As indicated in the Introduction of this Report, there is no general EU model applicable to postgraduate qualification in pharmacy. It should be developed based on the common grounds of the Higher Education Standards, Professional Qualification Framework and the requirements of the labour market. The Higher Education Council of Serbia is working on the establishment of a National Qualifications Framework which is to be harmonized with the European Qualifications Framework. Further work is

needed on the establishment of Sectoral Qualification Frameworks with that for Healthcare professions being specific and more demanding in comparison with other sectors.



## Situational Analysis Outcomes

The Situational Analysis conducted confirms that the pharmacy postgraduate qualification system in Serbia is well established and recognized in national regulations, as well as institutional policies and professional practice. There is a great potential for further improvement and reinforcement of the postgraduate qualification curricula at Serbian Universities. However, the results of institutional self-evaluation revealed that the existing postgraduate specialization curriculum is relatively rigid and conservative and could better meet the needs and expectations of the pharmaceutical profession. The main deficiencies recognized refer to the:

- (i) segmental organization scheme of the postgraduate courses and their 'departmentalization';
- (ii) poor vertical and horizontal association between the courses;
- (iii) small number of elective courses;
- (iv) lack of educational resources available, and
- (v) absence of harmonization with the internationally recognized postgraduate educational levels.

Additional problems refer to the:

- (i) limited use of the novel teaching/learning and assessment methods (the educational strategy is still, mostly, teacher-

- centered and conventional lecture based);
- (ii) use of information technologies (IT) which is, still, insufficient;
- (iii) practical/work placement for the students on professional specialization courses which is, increasingly, difficult to provide;
- (iv) extent of 'on site' contact time requirements which are quite demanding having in mind the part-time engagement of students and fact that teaching is mainly organized on weekends.

Following the Situational Analysis performed five 'priority topics' were identified:

- (i) introduction of a more flexible curricular structure with defined core modules and an increased number of elective modules;
- (ii) improvement of the existing course contents with an emphasis on both vertical and horizontal association between the modules;
- (iii) staff development and support training programs;
- (iv) development of educational resources and establishment of an e-learning environment and harmonization with the EU Qualifications Framework.

The elements of the relevant SWOT Analysis are presented in Figure 15.

STRENGTHS	WEAKNESSES
<p>Traditionally well established and recognized Professional Specialization System at the Faculty of Pharmacy, University of Belgrade:</p> <ul style="list-style-type: none"> <li>• 9 Professional Specialization study programmes</li> <li>• 5 Academic Specialization study programmes</li> <li>• competent and qualified academic staff</li> </ul> <p>Center for Continuing Education capacities available</p> <p>Technical capacities (administration, IT resources, lecture rooms ...) at the RS Universities</p> <p>Policy and practice of Work Placement as part of the Professional Specialization Curricula</p> <p>The importance of professional development recognized by the regulatory authorities</p>	<p>Segmental organization scheme of the postgraduate courses available and their «departmentalization»</p> <p>Poor «vertical» and «horizontal» association between the courses</p> <p>Small number of elective courses</p> <p>Lack of educational resources available</p> <p>Absence of harmonization with internationally recognized postgraduate educational levels</p> <p>Limited use of novel teaching/learning and assessment methods</p> <p>Insufficient use of information technologies (IT) in teaching and learning.</p>
OPPORTUNITIES	THREATS
<p>Great interest of pharmacy professionals and recent graduates in professional development</p> <p>Academic staff motivated and interested in improvement</p> <p>Support from the employing institutions</p> <p>Support from the governmental bodies and professional associations</p>	<p>Rigidity of the authorities in approval of new courses.</p> <p>Increased workload of the academic staff</p> <p>Lack of English language skills and inefficient computer literacy of pharmacy practitioners</p> <p>Increasing difficulties in providing practical work placements</p>

Figure 15. SWOT Analysis



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Appendix 1 

Postgraduate Specialization Study Programmes

Appendix 1

<b>Course Title</b>	<b>Professional Specialization in Clinical Pharmacy</b>	
<b>Duration of Study</b>	<b>3 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>9 months</b>
<b>Subject</b>	<b>Hours</b>	
Biostatistics	15	
Instrumental methods of analysis	15	
Pathophysiology	30	
Physiology	15	
Medicinal chemistry	15	
Pharmaceutical technology	15	
Pharmacokinetics	30	
Methodology in pharmacokinetics	15	
Clinical pathology	15	
Clinical pharmacology	30	
Clinical pharmacokinetics	45	
<b>Internship/Work Placement*</b>		<b>21 months</b>
Instrumental methods		4
Clinical pharmacy		11
Health team service or Research institution		6
<b>Research Work and Dissertation</b>		<b>6 months</b>
<b>Admission Criteria</b>	<b>Pharmacy graduates</b>	

\*at the Faculty of Pharmacy, Clinical Centre of Serbia, Military Medical Academy

<b>Course Title</b>	<b>Professional Specialization in Drug Analysis and Quality Control</b>	
<b>Duration of Study</b>	<b>3 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>9 months</b>
<b>Subject</b>	<b>Hours</b>	
Statistics	20	
Instrumental methods of analysis	44	
Organic chemistry	20	
Radiopharmacy	16	
Regulatory affairs	20	
Pharmaceutical chemistry	72	
Pharmaceutical Analysis and Drug Control	48	
<b>Internship/Work Placement*</b>		<b>24 months</b>
Chemistry and drug control		18
Pharmacological and toxicological drug control		4
Microbiological drug control		2
<b>Research Work and Dissertation</b>		<b>3 months</b>
<b>Admission Criteria</b>	<b>Pharmacy graduates</b>	
<b>Professional Recognition</b>	On completion of this course, the successful candidate receives the Professional recognition of the Quality Control Manager in the Pharmaceutical Industry, Representative offices for import and export of drugs, Hospital Pharmacies, Compounding Pharmacies	

\*Medicines and Medical Devices Agency of Serbia and Quality Control Units in the Pharmaceutical Industry which has implemented GLP and GMP

<b>Course Title</b>	<b>Professional Specialization in Medical Biochemistry</b>	
<b>Duration of Study</b>	<b>4 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>9 months</b>
<b>Subject</b>	<b>Hours</b>	
Medical Biochemistry	150	
Hematology	50	
Microbiology	30	
Genetics	30	
Laboratory Management and Good Laboratory Practice	30	
<b>Internship/Work Placement*</b>		<b>35 months</b>
Medical Biochemistry		20
Hematology		6
Microbiology		4
Genetics		2
Laboratory Management and Good Laboratory Practice		3
<b>Research Work and Dissertation</b>		<b>4 months</b>
<b>Admission Criteria</b>	<b>Pharmacy graduates, Medical doctors</b>	

\* Clinical Centres, Military Medical Academy, Health Institutes, Hospitals

<b>Course Title</b>	<b>Professional Specialization in Pharmaceutical Technology</b>	
<b>Duration of Study</b>	<b>2 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>9 months</b>
<b>Subject</b>	<b>Hours</b>	
Introduction to Research Methodology	12	
Pharmaceutical Technology	120	
Regulatory Affairs in Pharmaceutical Manufacturing	20	
Selected topics in Pharmacology	20	
Seminar work 1	8	
Biotechnological and Immunobiological drugs	20	
Herbal drugs and Phytotherapy	12	
Drug analysis and Quality control	20	
Seminar work 2	12	
<b>Internship/Work Placement*</b>		<b>12 months</b>
Preparation of dosage forms (Pharmacy)		2.5 - 5
Preparation of dosage forms (Hospital Pharmacy)		1 - 5
Manufacture of medicinal products (industry)		1 - 5
Preparation of herbal medicines		1
Drug analysis and quality control		1
<b>Research Work and Dissertation</b>		<b>3 months</b>
<b>Admission Criteria</b>	<b>Pharmacy graduates</b>	
<b>Professional Recognition</b>	On completion of this course, the successful candidate receives the Professional recognition of the Production Manager in the Pharmaceutical Industry	

<b>Course Title</b>	<b>Professional Specialization in Pharmacotherapy</b>	
<b>Duration of Study</b>	<b>3 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>9 months</b>
<b>Subject</b>	<b>Hours</b>	
Pharmacology	120	
Pharmacotherapy	120	
Pathophysiology	30	
Pharmacokinetics	20	
Pharmaceutical Technology and Biopharmaceutics	10	
<b>Internship/Work Placement*</b>		<b>23 months</b>
Pharmacology		6 weeks
Pharmacotherapy - case study		6 weeks
Pathophysiology		3 weeks
Clinical disciplines with Pharmacotherapy of certain diseases		18 weeks
Information Technology in Pharmacotherapy		5 weeks
<b>Research Work and Dissertation</b>		<b>4 months</b>
<b>Admission Criteria</b>	<b>Pharmacy graduates, Medical doctors</b>	

<b>Course Title</b>	<b>Professional Specialization in Quality Control and use of Medicinal Plants</b>	
<b>Duration of Study</b>	<b>2 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>9 months</b>
<b>Subject</b>	<b>Hours</b>	
Statistics	20	
Legal regulation and standards (in the production and use of herbal substances and herbal drugs)	20	
Morphological characterization and identification of herbal substances	40	
Chemical characterization and quality control of herbal substances, herbal preparation and herbal drugs	20	
Pharmacological characterization and use of herbal substances and herbal drugs	20	
Chemical characterization and quality control of herbal substances, herbal preparation and herbal drugs	60	
Pharmacological characterization and application of herbal substances and herbal drugs	60	
<b>Internship/Work Placement*</b>		<b>12 months</b>
Production of herbal substances, herbal preparation and drugs		1.5
Quality control of herbal substances, herbal preparation and herbal drugs		3 or 7
Medicinal application of herbal substances and herbal drugs		3 or 7
Non-medicinal application of herbal substances		0.5
<b>Research Work and Dissertation</b>		<b>3 months</b>
<b>Admission Criteria</b>	Pharmacy graduates, Medical doctors, Dentistry graduates, Chemistry graduates, Technology graduates, Biology graduates, Agriculture graduates	

Course Title		Professional Specialization in Sanitary Chemistry	
Duration of Study		3 years	
Taught Course at the Faculty of Pharmacy			9 months
Subject	Hours		
Statistics	20		
Instrumental methods of analysis	32		
Microbiological food and water control	20		
Toxicology <sup>a</sup>	12		
Physiology <sup>a</sup>	12		
Applied analytical chemistry <sup>b</sup>	16		
Data analysis in food chemistry	4		
Food safety control	40		
Biological value of foods	16		
Food biochemistry with diet therapy	32		
General methods in food analysis	32		
Food legislation	12		
Physical-chemical analysis of drinking water	16		
Internship/Work Placement*			24 months
Food, general items and drinking water control		12	
Food toxicology		5	
Instrumental methods		3	
Food biochemistry		3	
Microbiological food control		1	
Research Work and Dissertation			3 months
Admission Criteria		Pharmacy graduates, Chemistry graduates, Physical chemistry graduates, Technology graduates, Agriculture graduates	

<sup>a</sup> for pharmacist only; <sup>b</sup> for non-pharmacists

\*Health Care Centers, Health Care Institute, Military Medical Academy

Course Title	Professional Specialization in Toxicological Chemistry	
Duration of Study	3 years	
Taught Course at the Faculty of Pharmacy		9 months
Subject	Hours	
Statistics	20	
Instrumental methods of analysis	32	
Pathophysiology	40	
General Toxicology	20	
Toxicological Chemistry	60	
Occupational Toxicology	16	
Ecotoxicology	16	
Forensic Toxicology	16	
Clinical Toxicology	16	
Seminar work		
Selected Chapters of Physiology and Immunology (only for non-pharmacists)	28	
Internship/Work Placement*		24 months
Ecotoxicology		6
Occupational Toxicology		6
Forensic Toxicology		6
Clinical Toxicology		6
Research Work and Dissertation		3 months
Admission Criteria	Pharmacy graduates, Chemistry graduates, Physical chemistry graduates, Biology graduates, Technology graduates, Agriculture graduates	

<b>Course Title</b>	<b>Professional Specialization in Social Pharmacy</b>	
<b>Duration of Study</b>	<b>2 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		<b>12 months</b>
<b>Subject</b>	<b>Hours</b>	
Biostatistics	20	
Social Pharmacy	80	
Public Health, Ethics and Patient Rights	20	
Drug Management in Health	32	
Pharmaceutical Legislation	20	
Pharmacoepidemiology	40	
Seminar Work		
<b>Internship/Work Placement*</b>		<b>12 months</b>
Communications in Pharmacy		2
Patient and Drugs		1.5
Pharmacy Practice and Health Promotion		2.5
Pharmaceutical Health Care Quality		2
Rational Drug Usage		2
Pharmacoeconomy and Outcomes		2
<b>Research Work and Dissertation</b>		<b>3 months</b>
<b>Admission Criteria</b>	<b>Pharmacy graduates</b>	

<b>Course Title</b>	<b>Academic Specialization in Pharmaceutical Care</b>	
<b>Duration of Study</b>	<b>1.5 years</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		
<b>Subject</b>	<b>ECTS</b>	
Pharmacotherapy of cardiovascular and respiratory tract diseases	12	
Pharmacotherapy of central nervous system diseases	12	
Pharmacotherapy of gastrointestinal, endocrine and musculoskeletal diseases	12	
Pharmacotherapy of infective diseases and carcinomas; hematological and biochemical disorders	12	
Pharmacotherapy in the elderly, children, patients with hepatic and/or renal insufficiency, pregnancy and breastfeeding. Compliance	12	
Interactions and adverse drug effects, pharmacoeconomy and pharmacoepidemiology	12	
Drug information sources, evidence-based pharmacotherapy, critical appraisal of published trials; drug lists, guidances in clinical practice, clinical audit	12	
Pharmaceutical care in practice	6	
TOTAL	90	
<b>Admission Criteria</b>	<b>Pharmacy graduates</b>	

<b>Course Title</b>	<b>Academic Specialization in Pharmacoeconomics and Pharmaceutical Legislation</b>			
<b>Duration of Study</b>	<b>1 year</b>			
<b>Taught Course at the Faculty of Pharmacy</b>				
<b>Subject</b>	<b>ECTS</b>			
Pharmaceutical legislation	10			
Drug supply	7			
Pharmacoepidemiology	6			
Applied statistics in pharmacoeconomics	5			
Pharmacoeconomics	12			
Elective course (one of the following):	5			
<ul style="list-style-type: none"> <li>• Applied pharmacoeconomic methods in pharmacy practice;</li> <li>• Information technology in pharmacy;</li> <li>• Methodologies for drug pricing;</li> <li>• Registration dossier and post-marketing surveillance of drugs</li> </ul>				
Research Work and Dissertation			15	
TOTAL			90	
<b>Admission Criteria</b>	<b>Pharmacy graduates</b>			

<b>Course Title</b>	<b>Academic Specialization in Cosmetology</b>	
<b>Duration of Study</b>	<b>1 year</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		
<b>Subject</b>	<b>ECTS</b>	
Skin Physiology	3	
Cosmetic Ingredients	10	
Cosmetic Legislation	3	
Cosmetic Products Formulation and Manufacture	30	
Dermocosmetic Preparation	4	
Cosmetic Products Quality Control	4	
Selected Chapters of Dermatology	6	
Elective subject	5	
<input type="checkbox"/> Novel Cosmetic Delivery Systems <input type="checkbox"/> Plant Extracts in Cosmetic Products <input type="checkbox"/> Cosmetic Products Marketing		
Research Work and Dissertation	25	
TOTAL	90	
<b>Admission Criteria</b>	Pharmacy graduates, Medical doctors, Technology graduates, Chemistry graduates	

<b>Course Title</b>	<b>Academic Specialization in Industrial Pharmacy</b>	
<b>Duration of Study</b>	<b>1 year</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		
<b>Subject</b>	<b>ECTS</b>	
Pharmaceutical Research & Development	15	
Quality Assurance	10	
Drug Manufacture	15	
Drug Regulatory Affairs	5	
Elective subject	5	
<input type="checkbox"/> Drug Formulation <input type="checkbox"/> Drug Stability <input type="checkbox"/> Biopharmaceutical Drug Characterization <input type="checkbox"/> Risk Management		
Research Work and Dissertation	10	
<b>TOTAL</b>	<b>60</b>	
<b>Admission Criteria</b>	<b>Pharmacy graduates, Technology graduates, Veterinary doctors, Dentistry graduates</b>	
<b>Professional Recognition</b>	On completion of this course, the successful candidate receives the Professional recognition of the Production Manager in the Pharmaceutical Industry	

<b>Course Title</b>	<b>Academic Specialization in Pharmaceutical Management and Marketing</b>	
<b>Duration of Study</b>	<b>1 year</b>	
<b>Taught Course at the Faculty of Pharmacy</b>		
<b>Subject</b>	<b>ECTS</b>	
Pharmaceutical management	12	
Pharmaceutical marketing	8	
Information technologies in pharmacy*	7	
Quality in Pharmacy	8	
Elective subject <ul style="list-style-type: none"> <li><input type="checkbox"/> E-business in pharmacy</li> <li><input type="checkbox"/> Communications in pharmacy</li> <li><input type="checkbox"/> Innovation in pharmacy business</li> <li><input type="checkbox"/> Pharmacoeconomics</li> <li><input type="checkbox"/> Pharmacoepidemiology</li> </ul>	5	
Research Work and Dissertation	20	
<b>TOTAL</b>	<b>60</b>	
<b>Admission Criteria</b>	Pharmacy graduates, Medical doctors, Dentistry graduates, Veterinary doctors, Graduates in Social Sciences	

\* pharmacy = pharmaceutical, pharmacy practice




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Appendix 2   
Course Experience Questionnaire  
and Survey Results

Appendix 2



## Course Experience Questionnaire

*Monitoring and evaluation play an important role in our postgraduate specialization programme. We would be grateful if you could take a few minutes to complete the course evaluation form.*

A. I have been involved in the Postgraduate Specialization Course in \_\_\_\_\_

B. I have graduated:

- 0 - 5 years ago
- 6 – 15 years ago
- more than 15 years ago

C. I have been involved/graduated another formal Postgraduate Education Programme:

- No
- Yes
  - MSc
  - PhD
  - Specialization course
  - Other Courses (*specify*): \_\_\_\_\_

D. Why did you register to this Course (tick all that apply):

- to acquire new expertise
- to improve my expertise
- to improve my employability
- to meet the requirements for job posting/promotion
- other (*specify*) \_\_\_\_\_

E. How did you learn about the course?

- from the employer
- from the colleague
- from the Faculty of Pharmacy web site
- other (*please specify*)

F. How did the Course meet your expectations?

- perfectly
- partially
- well
- not at all

**G. What improvements could be made to the course? What aspects of your course were most in need of improvement?**

- Curriculum Design, Content and Organization
  - introduction of new topics (*please specify*) \_\_\_\_\_
  - more elective subjects (*please specify*) \_\_\_\_\_
  - less contact time
  - more contact time
  - other (*please specify*) \_\_\_\_\_
  
- Teaching, Learning and Assessment
  - problem based learning
  - computer aided learning
  - small group teaching
  - assessment in the form of tests
  - assessment in the form of individual seminars
  - other (*please specify*) \_\_\_\_\_

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Student Progression and Achievement (*please comment*)

Student Support and Guidance

Learning Resources

- Lack of literature in Serbian
- Insufficient use of Computer based learning

Quality Assurance and Enhancement

**H. Please tick (x) your response for each statement**

(5 – strongly agree; 4 – agree; 3 – disagree; 2 – strongly disagree; 0 – no answer)

Statement	5	4	3	2	0
The course program provided a broad overview of the relevant discipline					
The course material available was very good					
The course material was well organized					
The course content was compliant with my expectations					
The teaching staff motivated me to do my best work					
The teaching staff worked hard to make their subjects interesting					
Students' ideas and suggestions were used during the program					
The teaching materials and resources were helpful in directing my learning					
There has been more assessment of what I have memorized than of what I have understood on this course					
The workload was too heavy					
The teaching staff gave me helpful feedback on how I was going					
The program helped me develop my ability to work as a team member					
The program developed my problem-solving skills					
I learned to apply principles from this program to new situations					
The course has stimulated my enthusiasm for further learning					
I am pleased that I did this course					
The course contributed to my professional development					
The course will be of benefit to my employer/department					

**THANK YOU FOR YOUR FEEDBACK!**

## Survey Results

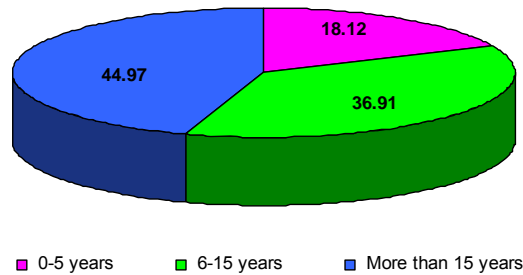


Fig. A2.1. Structure of the respondents (%) according to the time since graduation

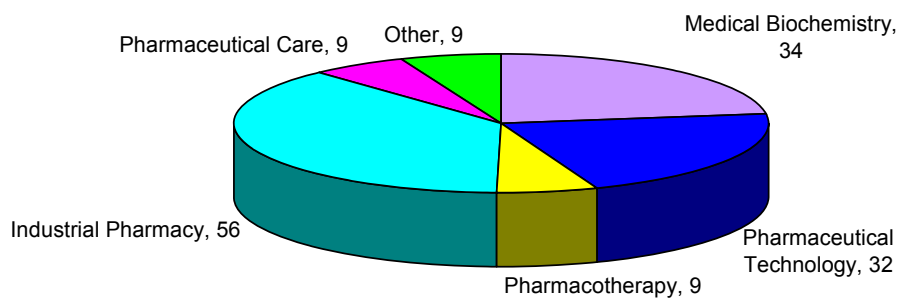


Fig. A2.2. Structure of the respondents according to the study programme

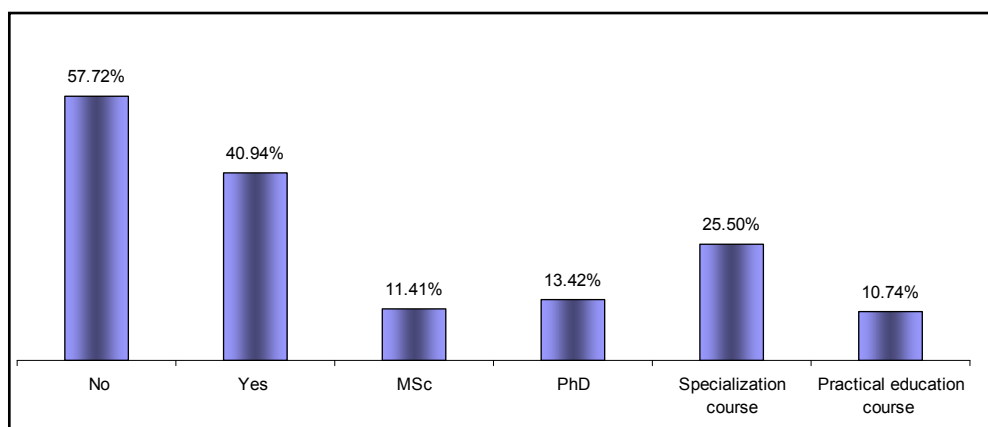


Fig. A2.3. Involvement of the respondents in other postgraduate qualification program

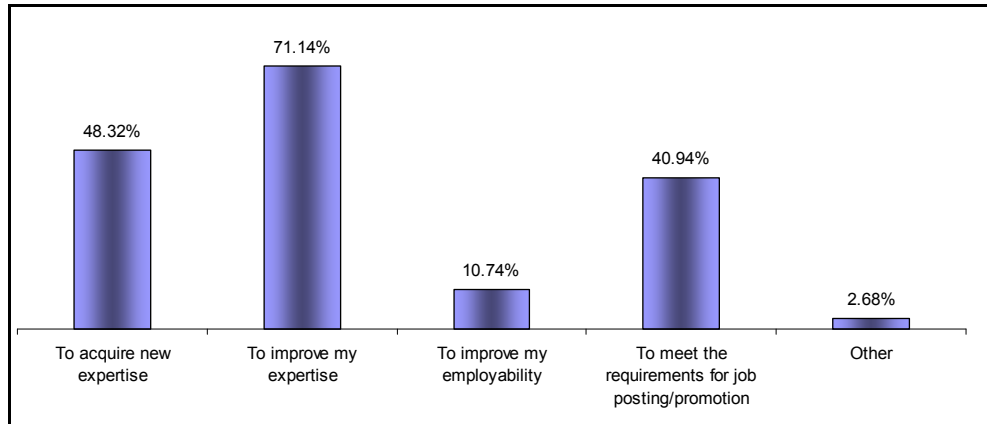


Fig. A2.4. Motive to enter the postgraduate qualification program

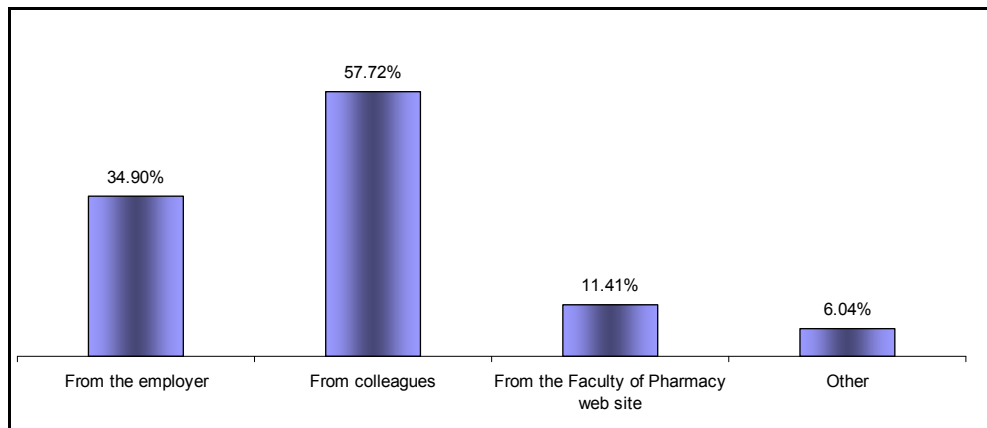


Fig. A2.5. Source of information about the study program

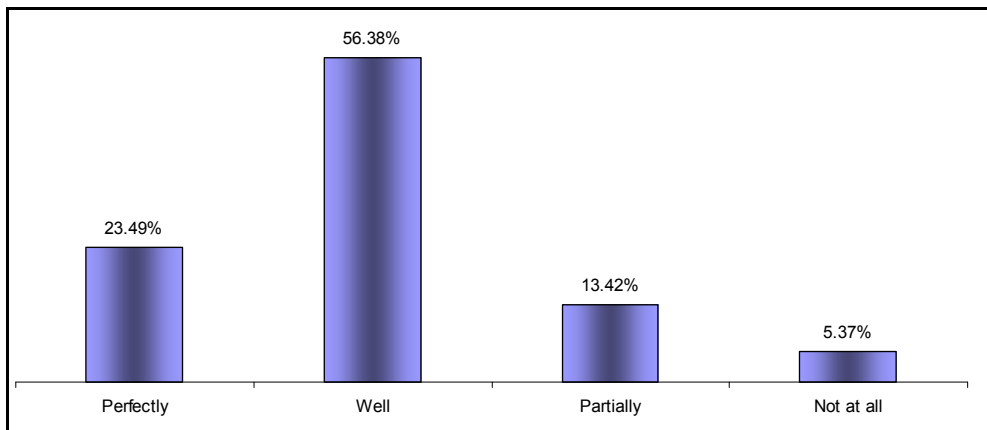


Fig. A2.6. Course contents and student expectations 'matching level'

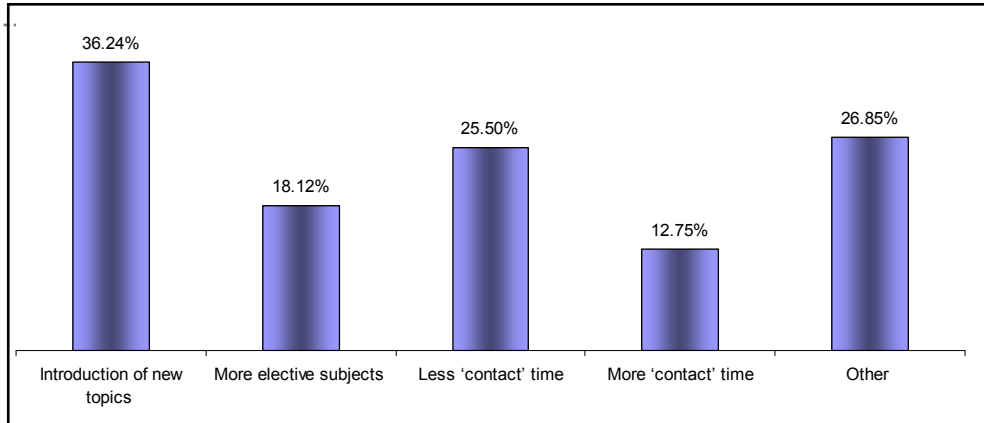


Fig. A2.7. Suggestions for Curriculum improvement related to Curriculum Design, Content and Organization

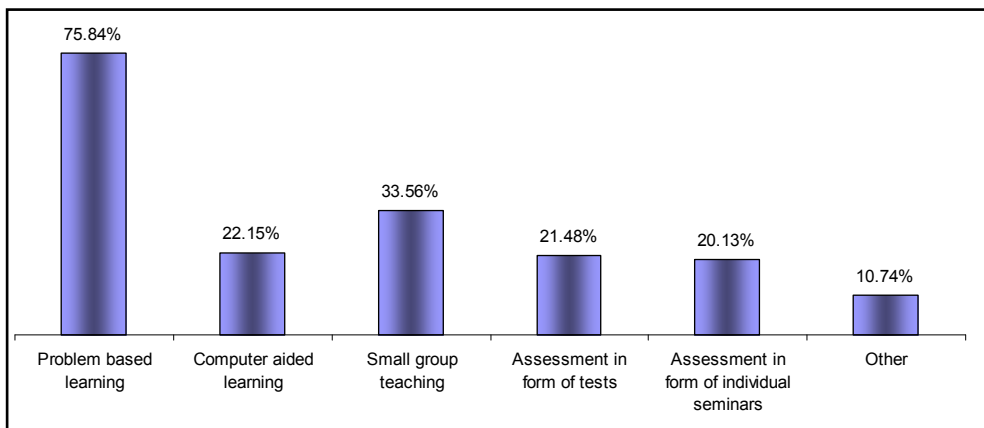


Fig. A2.8. Suggestions for Curriculum improvement related to Teaching, Learning and Assessment

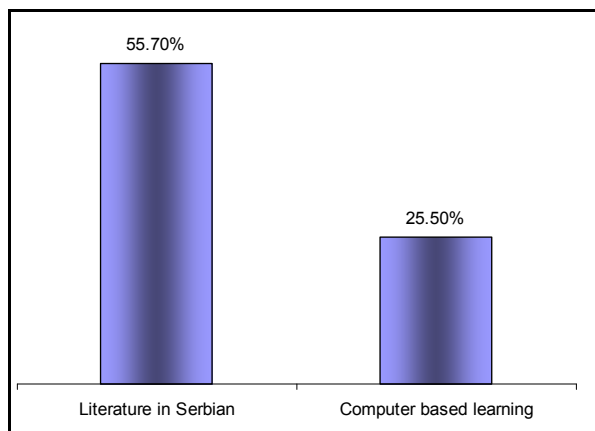


Fig. A2.9. Suggestions for Curriculum improvement related to Educational Resources

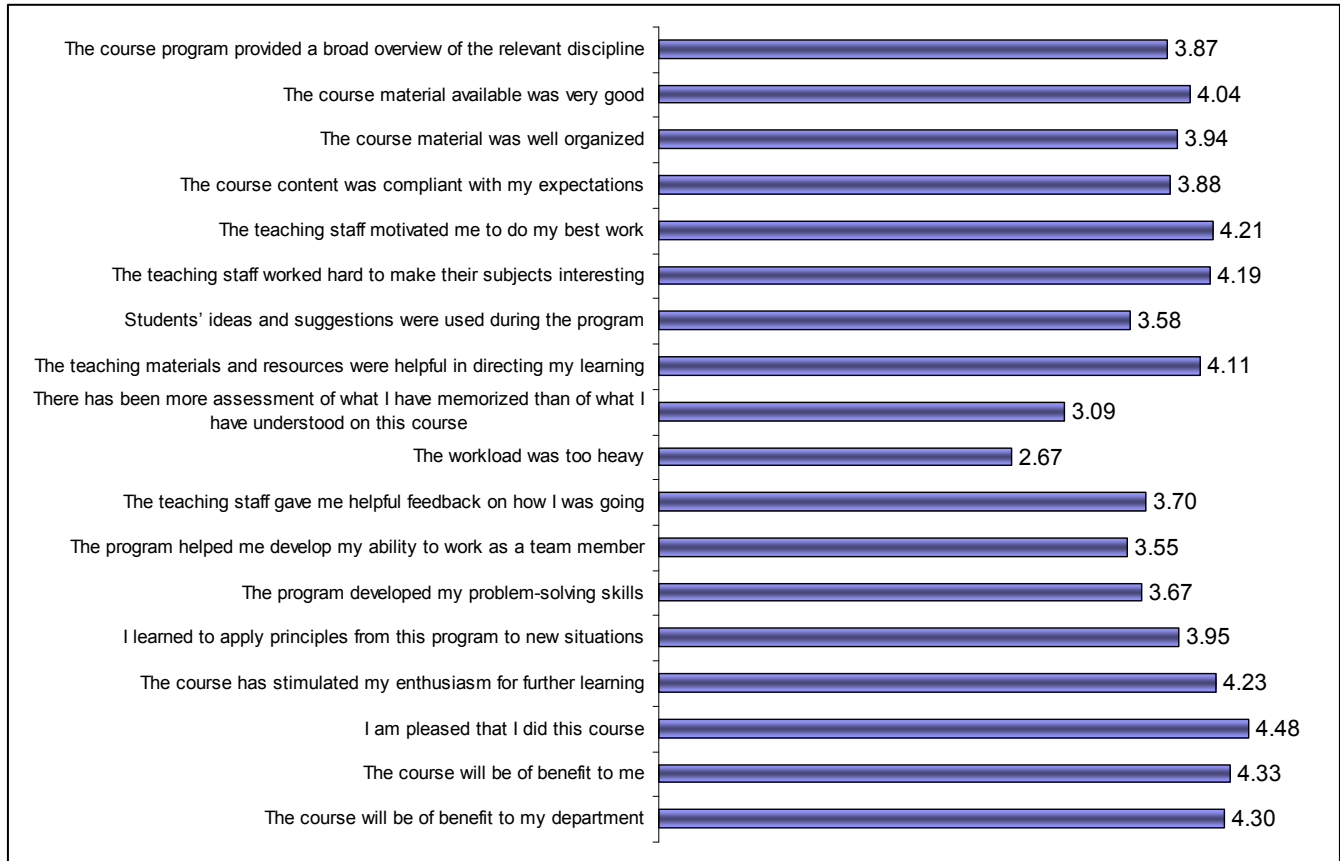


Fig. A2.10. Overall Course Experience