

DOCTORAL STUDIES QUALITY ASSURANCE AT UNIVERSITY OF RIJEKA WITH EMPHASIS ON STUDIES IN CIVIL ENGINEERING

N. OZANIC^{1,2}, B. KARLEUSA¹, G. JELENIC¹ and S.TICAK²

¹Faculty of Civil Engineering University of Rijeka, V.C.Emina 5, 51000 Rijeka, Croatia

²University of Rijeka, Croatia

e-mail: barbara.karleusa@gradri.hr

EXTENDED ABSTRACT

During 2005 all study programmes at Croatian universities underwent reforms according to Bologna declaration. Within the changes, the existing university postgraduate doctoral studies were reformed and the new ones started. There are 11 active postgraduate doctoral studies at the University of Rijeka today, among which the postgraduate university doctoral study of Civil Engineering performed by the Faculty of Civil Engineering was also started in 2005.

In order to assure the quality of doctoral studies and increase the doctoral studies completion rate at the University of Rijeka, the Postgraduate Studies Evaluation Board together with the Centre for Science and Centre for Quality Improvement of University of Rijeka has made the assessment plan for all doctoral studies and conducted the doctoral studies implementation evaluation at the University of Rijeka. The evaluation was based on self-evaluation report, doctoral student surveying and doctoral studies development plan.

This paper specially refers to the evaluation of university postgraduate doctoral studies at the Faculty of Civil Engineering, University of Rijeka, as well as to the recommendations made in order to improve this study. In implementing the doctoral studies evaluation, the Faculty of Civil Engineering has recognized the possibility of a systematic quality analysis of this study, the results of which are the base for its improvement.

In our opinion, the doctoral studies evaluation model established at the University of Rijeka and the experience made during the implementation at the Faculty of Civil Engineering are worth presenting to the representatives of facilities engaged in education of civil engineers as an example of good practice.

KEYWORDS

Bologna declaration, Study programme reform, Postgraduate university doctoral study, Evaluation, Postgraduate doctoral study of civil engineering

1. INTRODUCTION

During 2005 all study programmes were reformed according to the Bologna declaration principles at all universities in Croatia. The main principles of the Bologna declaration which are the base of the high education reform are the following [1]:

- adoption of a system characterized by easily recognisable and comparable academic and professional grades and introduction of a Diploma Supplement which enables easier employment and international competitiveness,
- adoption of a system based on two main cycles, the pre-graduate and the graduate, followed by the third, doctoral postgraduate cycle,
- introduction of ECTS (European Credit Transfer System) credits as an indicator of student obligation amount,
- promotion of mobility and impediment overcome to student and teacher circulation,
- promotion of European standards in quality assurance and
- promotion of a European dimension in high education.

Introduction of the aforementioned principles is conducted within the study programme domain while the principle implementation is based on introducing changes into the very educational process which includes new teaching methods, more student activity in classes, larger amount of independent student work outside classes and other.

The expected outcome is that the studies enable students not only to acquire the basic and technical knowledge but also specific general competences which are encouraged through European education systems so that upon completion of the studies the students are more qualified for work and, at the same time, also prepared to improve their knowledge and professional skills. Besides technical knowledge, the developed learning skill, proficiency in mother tongue and one foreign language, mathematics, entrepreneurship, social skills within a multi-cultural surroundings and good manners are the required competences at the European parliament level. Since those are the basic elements of the European education policy, the introduction of those into the Croatian high education, where all the stated elements must be transparent, was an imperative. By reforming the existing and introducing the new study programmes, the University of Rijeka (Figure 1) has been developing in the mentioned direction.

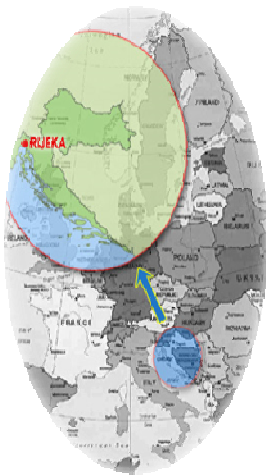


Figure 1: University of Rijeka (Croatia) – Location

A new model of university studies has been introduced which has three education cycles at most faculties, this being 3 + 2 + 3 years. Within this model the pre-graduate study lasts for 3 years, the graduate study for 2 years and the doctoral study for 3 years (Figure 2). At some faculties the pre-graduate and the graduate studies are performed as integral studies in duration of 5 or 6 years (Faculty of Medicine and Faculty of Law) which are followed by a postgraduate doctoral study cycle.

Within the above mentioned reform, the existing studies have been reformed and the new university postgraduate doctoral studies introduced. The University of Rijeka has 11 active postgraduate doctoral studies today among which is the postgraduate doctoral study of Civil Engineering which was introduced in 2005 and is performed by the Faculty of Civil Engineering, University of Rijeka (Figure 3).

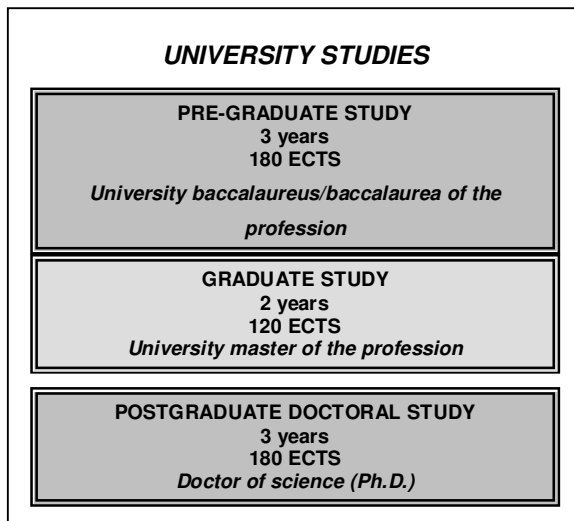


Figure 2: The most common schemes of university studies at faculties of University of Rijeka



Figure 3: Faculty of Civil Engineering, University of Rijeka

According to the Strategy of University of Rijeka [2], the University goal is to become a research university with the established research profile, quality centres, collaborative research projects, institutional care for development of research careers and a doubled scientific production.

In order to ensure the doctoral study quality and increase the success rate of doctoral study completion, by the Resolution of the Senate dated on May 12th 2009 the University of Rijeka founded a Committee for Postgraduate Study Assessment whose task is to implement the assessment of postgraduate study programmes which have executed at least one year of study.

The paper presents the procedure and the results of the conducted assessment of all postgraduate doctoral programmes at the University of Rijeka in detail with special regard both to the assessment of the university postgraduate doctoral study of Civil Engineering which is being performed at the Faculty of Civil Engineering, University of Rijeka and to the recommendations made for improving this study.

2. POSTGRADUATE DOCTORAL STUDY PROGRAMME ASSESSMENT PROCEDURE AT UNIVERSITY OF RIJEKA

As aforementioned in the introduction, the postgraduate doctoral study programme assessment at the University of Rijeka was based on self-evaluation of study holders, surveying of doctoral candidates and doctoral study development plan. When assessing the doctoral programmes, the outcomes and tasks stated in the Strategy of University of Rijeka as well as the principles of the European Research Charter according to the European Researcher Conscriptio Codex had to be taken into account. Besides a thorough analysis of programme implementation and standard quality evaluation parameters, the following parameters were included into the assessment process:

- tutorial capacity of studies and advisors' systematic supervision of student progress;
- advisor selection criteria;
- duration of studies, that is, the length of time required for completion of doctoral thesis after study enrolment;
- investments into the doctoral studies and doctoral candidates;
- the opportunity of being educated at other institutions during doctoral studies;
- the involvement of participating in doctoral studies and advisorship when setting teaching quotas.

In order to introduce the resolutions of the Senate and the assessment, the outcomes and the tasks had to be made concrete. The self-evaluation form and the doctoral candidate surveying form (questionnaires) were prepared. The University Board for Quality and the vice-deans for science affairs of all University components stated their opinion on the forms. Each component of the University had to have the self-evaluation of their doctoral programme conducted. The Committee founded an "evaluator base" which includes eminent Croatian and foreign scientists. The schedule for new doctoral study implementation assessment which undergoes the evaluation was created for each University component. Those are study programmes which have executed at least one year of study.

The Self-evaluation form and the student questionnaire were forwarded to the Faculties and University Departments which were also expected to make the self-evaluation report within a month. The reports were then forwarded to external evaluators for judgement

and in the meantime the dates for expert team visitations were arranged with heads of institutions.

Expert team members visited the components and, based on the self-evaluations and student questionnaires as well as visits to the institutions, entered their opinions and remarks about the doctoral studies into the forwarded forms which were then delivered to the University of Rijeka. The Committee has included all evaluations into the Study – Doctoral Study Implementation Assessment at University of Rijeka. Based on evaluator opinions, that is, the final reports of the Doctoral Study Implementation Assessment at University of Rijeka, every component was requested a statement. Then the Committee for Postgraduate Study Evaluation wrote the final report containing recommendations about improvement/changes in implementing doctoral studies at each component of the University. The Faculties and University Departments which have so far not sent the postgraduate doctoral study programmes to accreditation or have not been performing such programmes are asked to discuss the matter and make a plan of their contribution to the development of the University as a research university.

The conducted assessment has pointed out that the doctoral studies of University of Rijeka have been assessed as relatively good, but that there are some deficiencies. It seems that different evaluation groups were unequally critical towards the present state and that some of the proposals do not concur with the University development strategy or are not in accordance with the positive legislative regulations of Republic of Croatia.

The main objections of the committees and the problems which were pointed out regarding one or several doctoral studies of the University of Rijeka can be shortly presented in relation to the Faculties:

- A better selection of the doctoral candidates must be performed (School of Medicine, Faculty of Maritime Studies).
- There is an unequal treatment of doctoral candidates who are employees of the faculty and those who are not, which occasionally creates problems (Faculty of Engineering, Faculty of Humanities and Social Sciences).
- The research priorities should be better defined (School of Medicine).
- The criteria for teachers and advisorship should be better defined (School of Medicine, Faculty of Civil Engineering, Faculty of Maritime Studies).
- The advisor should have a greater influence in selecting the doctoral thesis topic (Faculty of Engineering).
- The submission of the doctoral thesis topic upon registration for the second year of studies is untimely (Faculty of Economics).
- The number of courses should be reduced (School of Medicine, Faculty of Engineering, Faculty of Civil Engineering, Faculty of Humanities and Social Studies).
- Number of elective courses: too large a number of elective courses at the School of Medicine makes the teaching more difficult; on the other hand, the students of Faculty of Economics are of opinion that the number of elective courses is far too small.
- Teaching in English should be introduced so that experts from abroad could be involved in the teaching process (School of Medicine).
- Financing the studies only from tuition fees is insufficient for conducting studies of high quality (Faculty of Civil Engineering, Faculty of Humanities and Social Sciences).
- The premises, the equipment and the professional literature are insufficient (Faculty of Civil Engineering, Faculty of Humanities and Social Sciences).

The Committee for Postgraduate Studies recommends the Senate to give consideration to the stated objections of the evaluators and accordingly oblige the faculties to particular changes in implementing their doctoral studies, which has been done.

3. ASSESSMENT OF POSTGRADUATE DOCTORAL STUDY OF CIVIL ENGINEERING AT THE FACULTY OF CIVIL ENGINEERING, UNIVERSITY OF RIJEKA

3.1 Description of the doctoral study programme

The Faculty of Civil Engineering of the University of Rijeka runs a doctoral study programme organized within the subject areas of Geotechnics, Hydraulics, Materials, Fluid Mechanics and Mechanics of Solids and Structures.

The main objective of the study programme is to endow the students with efficient education on the basis of the proposed educational and research activities, including the expansion of their existing knowledge, skills and expertise through conducting original scientific research activities. Such activities must meet the internationally accepted quality standards and contribute significantly to the development of the scientific thought within one of the fields of research available at the Faculty. After the completion of the study programme, the students are qualified to independently conduct advanced scientific research. An additional objective of the doctoral study programme is to develop or enhance the ability of students to present their work, lead a debate providing logical argumentation in regard to positive scientific facts (related to information, problems and possible solutions) to the professional and non-professional audience.

Monitoring the quality of the programme is of key importance and is being conducted through various forms of evaluation and self-evaluation of teachers, students and the related services, through supervision of the implementation and delivery of the study programme, and by accepting objective quality measuring methods [3].

The study programme lasts six semesters, during which time the students acquire 180 ECTS if they complete all their study obligations successfully. The semesters are not necessarily linked to the academic years (apart from the first semester in which the obligatory courses are being lectured) and the students are free to adapt the rhythm of studying according to their other obligations and abilities. The study obligations are divided in three categories:

1. Taught (educational) study obligations – attendance to core and optional courses and taking exams on the basis of which the students earn at least 48 ECTS, including
 - 1.1 Core courses within a chosen subject area by means of which the students earn 30 ECTS;
 - 1.2 Optional courses by means of which the students earn at least 18 ECTS.
2. Research activities, by means of which the students earn at least 120 ECTS.
3. Additional study obligations in teaching and knowledge transfer by means of which the students earn at least 12 ECTS.

During the first semester the students are introduced to the theoretical basics essential to the chosen subject area. During the second semester the students take optional courses and commence with the research leading up to the selection of the doctoral dissertation topic. During the third semester the student starts with the doctoral dissertation research activities, the topic of which must be registered and publicly defended during the semester in order to be accepted by the Faculty Council at the end of the semester. During the fourth, fifth and sixth semesters the student dedicate their time fully to doctoral

dissertation research activities, including the process of writing it up. The procedure is explained in more detail in [3].

At the enrolment in the study programme the student is appointed a counselor and within the period of two semesters, the Faculty Council must confirm the student's choice of counsellor as a thesis supervisor or appoint another supervisor. Twice a year (January and July) the consellor/supervisor submits to the Dean the Student Progress Report. The report gives a concise evaluation of the student's work during the last six months, his/her progress in the framework of the overall study programme, and the estimated dynamics of the further course of study.

The student must submit an application for acceptance of the chosen dissertation topic at the beginning of the third semester and publicly defend the proposed topic of his/her doctoral dissertation before the relevant committee appointed by the Faculty Council.

After the completion of the doctoral dissertation and fulfilling all other doctoral study obligations, the student submits a written application for evaluation of his/her doctoral dissertation. The article in which the student, as the first author, presents the results and findings of his/her entire research conducted during the preparation of the doctoral dissertation or a part of it must be published in one of the reputable SCI non-domestic journals. The doctoral dissertation is evaluated by the Doctoral Dissertation Evaluation Committee. If the Faculty Council receives a positive report on the doctorate dissertation, it appoints a Doctoral Dissertation Defence Committee. The defence of the doctoral dissertation is also public. After the doctoral dissertation has been defended, the Doctoral Dissertation Defence Committee reaches a decision on the results of the doctoral dissertation defence which is publicly announced.

3.2 Self-evaluation and student questionnaires

All surveys and interviews have been conducted on the University forms prepared beforehand and made available to the external evaluators along with the actual study programme. Various methods and procedures have been used to monitor and evaluate the quality of teaching and the effectiveness of course delivery:

1. Surveys and interviews with students in regards to all aspects of the teaching process:
 - Regularity and organization of course units,
 - Literature,
 - Methods of improving the quality of teaching,
 - Exams,
 - Communication and cooperation with lecturers,
 - Course programme and methodology of delivery.
2. Public presentation of results obtained on the basis of surveys and interviews,
3. Analysis of the examination system (performance, transparency, objectivity, and the like).

3.3 External evaluation

External evaluators have visited the Faculty and met with Dean and the member of the management, members of the Postgraduate Study Board, teachers, students and the administrative staff. Principally, they concluded that the proposed postgraduate doctoral study programme is well organized, well written, the subject is contemporary, the teachers are highly qualified and the proposed doctoral study is comparable to the study on other high qualified universities.

However, they have drawn the attention to the following points which require action for improvement [4]:

1. An appropriate University body should verify and confirm thesis selection;
2. As the work on the doctoral thesis is considered the core of the study, it is advised to increase the proportion of elective courses while at the same time decreasing the total study load related to formal subjects to at most 20% of the total study load, make elective courses less teaching and more learning orientated, and make elective courses more related to the selected thesis (e.g. by declaring possible theses directions prior to particular thesis selection, and selecting electives within this directions);
3. Nominal duration of two years for the work on a thesis is traditionally considered insufficient in engineering fields and should be increased to e.g. three years for a full time student. Increasing the percentage of time dedicated to research is suggested;
4. Somewhat insufficient is the distribution of scientific articles in good journals per lecturer. More consideration should be paid to this deficiency in the future in order to ensure the quality of study. At the same time, according to the world trends, for the rating of teacher quality more thought should be paid also to ensure adequate number of citations in high quality journals;
5. Perhaps there is not enough cooperation on international projects, which can however be increased with the active Faculty politics;
6. According to regulations, a supervisor should at the same time be an active researcher. In principle, this is demonstrated with the number of published scientific articles in high quality journals (journals in Science Citation Index Expanded base). Since this criteria, as noted, is not defined quantitatively yet, we suggest to make it formal in the way that the supervisor should have a certain number of papers published in good journals with adequate citation record.
7. The number of students per mentor seems in some cases rather high (two mentors have six PhD students each.)
8. It would be advisable to implement a formal complaining procedure that students could safely undertake whenever necessary.
9. The accessibility of scientific literature is accordingly regulated, but nevertheless, more attention should be placed on it.

As examples of good practice the evaluators pinpoint the following:

1. The PhD student needs to actively participate at another scientific institution for one semester during his study. This can take place in the Republic of Croatia or abroad. This aspect of study is extraordinarily positive since it may give a flavor of international research to the students and help establish international cooperation for the teaching staff.
2. An important requirement is also that the candidate needs to write at least one scientific paper related to his thesis, which must be issued in an elite scientific magazine. This extraordinarily useful requirement ensures additional quality of the PhD thesis but may be tough for part time students working elsewhere.

3.4 Faculty closure

The Faculty has closely examined the evaluators' report and decided to take the following steps to improve its study programme:

1. Support the idea that thesis selection should be approved by a newly formed University body and pass the initiative to University;
2. Support the finding that doctoral study programmes in engineering require at least three years of full-time research work on the thesis. As some teaching is necessary in the

third-cycle Bologna stage (old MSc courses do not exist anymore) [4] doctoral study programmes should of necessity last at least four years and carry 240 ECTS. Pass the initiative to University and prepare for a modification of the study programme in future.

3. Support the suggestion that the selection of teachers and in particular the supervisors should be made depending on their scientific output in reputable international journals and prepare for a modification of the study programme in future.

4. Make the international collaboration on the grounds of joint research projects a strategic goal for the Faculty.

4. CONCLUSION

The conducted assessment has pointed out that the doctoral studies of University of Rijeka have been assessed as relatively good, but that there are some deficiencies. It seems that different evaluation groups were unequally critical towards the present state and that some of the proposals do not concur with the University development strategy or are not in accordance with the positive legislative regulations of Republic of Croatia. This can partly be explained by the fact that the consulting editors are mostly foreigners who are not familiar with the Croatian legislative regulations.

The evaluation which was conducted at the postgraduate doctoral study of Civil Engineering has also resulted in a fairly well assessed programme with lesser constructive objections. The Faculty management has taken the conducted assessment very seriously. Based on observed deficiencies an improvement programme has been created and is prepared to be implemented.

Based on the objections of evaluators, the Committee for Postgraduate Study Assessment and the Senate of University of Rijeka has obliged the all faculties to introduce programme and implementation changes of postgraduate doctoral studies which they perform.

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