ANALYSIS OF EFFICACY OF STUDYING OF THE FIRST GENERATION OF STUDENTS WITH NATIONAL MATRICULATION

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Abstract

The Bologna process and the introduction of national matriculation implemented major changes in higher education institutions.

The abolition of entrance exams at most faculties, as a consequence of introduction of national matriculation, simplified and accelerated enrolment in faculties. Due to extensive preparations for the implementation of national matriculation and numerous checks that students had to pass in order to successfully pass the national matriculation exam, it was assumed that the enrolled students would achieve better results than the previous generation. The motivation for this research is to determine whether this was the case, that is, is the generation of students that took the national matriculation exam more successful than the previous generation of students, which did not.

This paper aims to investigate whether the introduction of national matriculation has resulted in enrolmentof higher quality students, who achieve higher average grade, better pass rate and completion within the stipulated duration of studies, than the students enrolled prior to introduction of national matriculation. The indicators that are analysed in this paper are interest in the study, structure of enrolled students (vocational school or gymnasium, gender), pass rate per study program, average grade, pass rate and average grade in relation to the number of examattempts, analysis of the number of graduates, average length of study and average grade of the entire study. The research was conducted using the available data on the 2009/10 generation of full-time students of undergraduate university studies, as the last generation of students who were enrolled in the first year of studywithout national matriculation, and the 2010/11 generation, as the first generation of undergraduate university studies that was required to pass the national matriculation exam and was enrolled in the first year of study based on the results of the national matriculation exam.

JEL classification: I21; I23

Keywords: higher education, efficacy of studying, national matriculation

Introduction

The topic of this paper is the analysis of students' study performanceafter the introduction of national matriculation.Introduction of national matriculation caused significant changes in the method of organization of enrolment in faculties, which ultimately affected specific indicators of success in studying.The abolition of entrance exams at most faculties, as a consequence of introduction of national matriculation, simplified and accelerated enrolment in faculties.Similar enrolment systems exist in other countries in the world, e.g. in Israel (Oren; 2014).Some faculties have chosen not to abolish their entrance exams, since general frameworks provided by national matriculation did not meet their requirements for selection of students. These are mainly academies of art, medical schools, etc.

This paper aims to show in what manner did introduction of national matriculation affect enrolment of higher quality students, who achieve higher average grade, better pass rate and completion within the stipulated duration of studies, than the students that were enrolled prior to introduction of national matriculation.

The indicators that we track in this paper are:

- interest in the study,
- structure of enrolled students (vocational school or gymnasium, gender),
- pass rate per study program,
- average grade,
- pass rate and average grade in relation to the number of exam attempts,
- analysis of the number of graduates, average length of study and average grade of the entire study.

The research was conducted using the available data on the 2009/10 generation of full-time students of undergraduate university studies, as the last generation of students who were enrolled in the first year of studywithout national matriculation, and the 2010/11 generation, as the first generation of undergraduate university studies that was required to pass the national matriculation exam and was enrolled in the first year of study based on the results of the national matriculation exam. Due to extensive preparations for the implementation of national matriculation and numerous checks that students had to pass in order to successfully pass the national matriculation exam, it was assumed that the enrolled students would achieve better results than the previous generation. The motivation for this research is to determine whether this was the case, that is, is the 2010 generation more successful than the 2009 generation.

The paper consists of several parts:theoretical framework, overview of research methodology, presentation of research results and conclusions, limitations of the research, and recommendations for further research.

Theoretical framework

The biggest reform of higher education (Bjeliš; 2008,9)on European territory began in 1988 in Bologna, with an university charter of rectors of European universities, the aim of which was to establish a common European educational space, in order to create common higher education area and ensure mobility and employment of citizens throughout the European Union.

The Bologna Declaration and the documents related to the Bologna Process are achieving common objectives in the area of higher education in the EU. The Bologna Declaration was signed on June 6, 1999 in Bologna, initially by 29 countries, while a total of 46 countries¹ participates in the Bologna Process today, all of them striving to create competitive common European higher education area.

The Republic of Croatia joined the Bologna Declaration in May 2001 in Prague.

¹ Albania, Andorra, Armenia, Austria, Azerbaijan, Belgium (Flemish and French community), Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Vatican, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Montenegro, Slovakia, Slovenia, Spain, Sweden, Switzerland, Macedonia, Turkey, Ukraine, United Kingdom.

"Bologna" is designed so that each signatory country adapts it to its needs and capabilities within frameworks they have accepted. The main objective of the Declaration is "to create a European space for higher education in order to enhance the employability and mobility of citizens and to increase the international competitiveness of European higher education" (cited byObermanPeterka; 2008), taking into account diversity of cultures, languages and education systems in Europe.

Bologna reform places studentsat the very centre of the education system, improves their mobility and quality of studying by introducing ECTS credits and harmonizing the structure of studies.

The objectives of the Bologna Declaration are³:

- Adoption of a system of easily readable and comparable academic and vocational degrees and implementation of the Diploma Supplementfor easier and faster employment and international competitiveness of the EHEA.
- Adoption of a uniform system of two cycles of studying: undergraduate and postgraduate. The first three-year study is a requirement for qualification in the European labour market, while the second cycle leads to the master and/ or doctorate degree.
- Establishment of a system of credits(ECTS). Credits can also be acquired in non-higher education contexts, through the so-called lifelong learning.
- Promotion of mobility and overcoming obstacles to free movement of students and teachers.
- Promotion of European co-operation in quality assurance.
- Promotion of the necessary European dimension in higher education.

The importance of Bologna, increased autonomy and accountability, and institutionalization of higher education have prompted the introduction of quality assurance as one of the important factors of comparability of quality of study programs, introduction of a common education system and mobility of students and teachers.

² The Bologna Declaration, on the European space for higher education: an explanation, prepared by the Confederation of EU Rectors' Conferences and the Association of European Universities, February 29, 2000

³ http://public.mzos.hr/Default.aspx?sec=2280accessed onFebruary 10, 2014

All study programs conducted at Croatian higher education institutions and all the new programs are aligned with the Bologna principles and evaluated by the National Council for Higher Education with the expert support of the Agency for Science and Higher Education.

The implementation of the Bologna process is monitored by the Ministry, through its Decision on appointing the National group for monitoring the Bologna Process. The National group for monitoring the Bologna Process is composed of representatives of the National Council for Higher Education, the Agency for Science and Higher Education, the Independent Union of Research and Higher Education Employees of Croatia, the National Competitiveness Council and the civil society.

Quality assurance systems at all levels require relevant objective statistical indicators and analyses, which are the basis for assessing the situationand making strategic and development measures.

Strategic plan for building a quality assurance system at the J.J. Strossmayer University of Osijek emphasizes the importanceof management and improvement of quality at the University, which is based on the mission, program and organization of studies, scientific, research and professional work, infrastructure, employees and students, as well as mechanisms of control and adjustment of the quality improvement system (Barković, D., 2012).

Introduction of the national matriculation also introduced the external evaluation system, which represents an objective criterion for the assessment of secondary education. External evaluation is an educational policy where quality of education is measured according to results of standardized tests drawn up by a designated independent body. In Croatia, that body is called National Centre for External Evaluation of Education.⁴

The original goal of national matriculation (Ćosić, 2012) was not to equalize all the secondary schools and their programs. Instead, the objective of this type of external evaluation was aimed at raising the quality of education, since education is the key component of development of today's societies.

⁴ www.ncvvo.hr, accessed on February 12, 2014

Methodology

Used in the research were descriptive statistical methodswith standard indicators, such as: mean, standard deviation, median, mode, in order to better describe the phenomena.In order to test the stated hypotheses, t-test was used, with the assumption that the (actual) variances are equal. Also, with the assumption that the (actual) variances are unequal, Welch's t-test was used. Welch Two Sample t-test is an adaptation of Student's t-test intended for use with two samples having possibly unequal variances.

Data available in the Information System for Higher Education Institutions (ISVU) for the observed two generations of students was used. Research was conducted using data for full-time students of the Faculty of Economics in Osijek. The sample consists of full-time students enrolled in undergraduate university study in academic year 2009/2010 and academic year 2010/2011. The sample is comprised of 419 studentsenrolled in 2009 and 357 students enrolled in 2010. The structure of enrolled students is given in the below table:

Table 1: Structure of students by completed secondary school and vocational area

Completed secondary school				Vocational area			
2009 2010		2009		2010			
Gymnasium	Vocational	Gymnasium	Vocational	Economics	Other	Economics	Other
163	256	180	177	237	19	146	31

Source: Authors' processing of the ISVU data

Regarding the generation enrolled in 2009, there is a higher proportion of students with completed vocational school in relation to students with completed gymnasium, while in 2010 this number was almost equalized. This was not expected, because the prevailing opinion in the media and the scientific public (Bezinović, 2009) was that students with completed vocational schools have little chance to successfully pass the matriculation. In vocational area, the most represented were the students with completed economics school – which was to be expected.

	20	09	2010		
	Number	Percentage	Number	Percentage	
Male	157	37.47 %	170	47.75 %	
Female	262	62.53 %	186	52.25 %	

Table 2: Structure of students by gender

Source: Authors' processing of the ISVU data

Compared to 2009, there is a noticeable increase in the proportion of male students in 2010, from 37% to almost 48%. We can say that proportion of students by gender has equalized.

Regarding the identified problem, the following hypotheses have been set:

 H_1 :There is a statistically significant difference in the average grade between the generations enrolled in 2009 and in 2010.

 H_2 : There is a statistically significant difference in the exam pass rate between the generations enrolled in 2009 and in 2010.

Results and discussion

The conducted analysis has resulted in the following descriptive statistics indicators:

	2009	2010
Mean	3.655	3.700
Median	3.588	3.603
Mode	3.412	3.235
Standard Deviation	0.468	0.512
Sample Variance	0.219	0.262
Minimum	2.588	2.882
Maximum	4.892	4.765
Count	157	82

Table 3: Average grade at the study

Source: Authors' calculation

Hypotheses are $H_0: \mu_1 = \mu_2$ versus $H_1: \mu_1 \neq \mu_2$ – using t-test, the p-value is 0.05009 which is greater than 0.05, therefore the null hypothesis is accepted, i.e., there is no difference in average grade between the 2009 and 2010 generations. Here it is assumed that the (actual) variances are equal. Let us assume that the variances are unequal (Welch's version of t-test). Again, the p-value is 0.5133, which is greater than 0.05, therefore, the null hypothesis is again accepted, i.e., there is no difference in average grade between 2009 and 2010 generations.

Exam pass rate	2009	2010
Mean	0.803	0.883
Median	0.796	0.909
Mode	0.972	0.972
Standard Deviation	0.136	0.107
Sample Variance	0.018	0.011
Minimum	0.461	0.547
Maximum	1	1
Count	157	82

Table 4 : Exam pass rate

Source: Authors' calculation

HypothesesareH₀: $\mu_1 = \mu_2$ versus H₁: $\mu_1 \neq \mu_2$ – using t-test, the p-value is 5,754 * 10⁻⁶, which is lower than 0.05, therefore the null hypothesis is rejected, i.e., there is a statistically significant difference in exam pass rate between the 2009 and 2010 generations. Here it is assumed that the (actual) variances are equal. Let us assume that the variances are unequal(Welch'sversion of t-test). Again, the p-value is 1.264 * 10⁻⁶, which is lower than 0.05, therefore the null hypothesis is again rejected, i.e., there is a statistically significant difference in exam pass rate between the 2009 and 2010 generations.

Results were partially not in line with our expectations. With regard to introduction of national matriculation, an increase of average grade was expected because of the more demanding enrolment system. On the other hand, the difference in exam pass rate is statistically significant. This could have been affected by various factors, such as the introduction of the system in which the number of exam attempts is limited to four exam attempts in an academic year, and the fourth exam attempt takes place before examination committee (Regulation on studies and studying, 2010).

Conclusion

Both generations continue to show great interest in studying at the Faculty of Economics in Osijek, which is confirmed by the number of student applications with regard to enrolment quotas. The previous indicators were not relevant because of different criteria and methods of evaluation of the knowledge of students who are continuing their education at faculties and colleges. With the introduction of national matriculation, the comparison of acquired knowledge of secondary school graduates will be interesting, measurable and will show the real state, structure and quality of the enrolled students.

Using the available data and applying appropriate scientific methods, the first hypothesis is rejected. There was no increase in average grade in students that have passed the national matriculation exam in relation to students enrolled a year earlier. The second hypothesis is accepted. Students of the 2010 generation are achieving better exam pass rate than the students of the 2009 generation.

Limitations of the research are the following: data from only one higher education institution and one component of that institution was used, only the data for students who have fulfilled their obligations in time was observed. It would be interesting to repeat the study at some other higher education institution (or at some other components), as well as on students who are lagging behind in fulfilling their obligations, anddetermine the causes of higher exam pass rate of students with passed national matriculation exam. Also, a similar research should be conducted once it becomes possible to compare several generations of graduated students enrolled based on their success at the national matriculation exam, since data for just one generation of graduated students is currently available.

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