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Original Paper

Evaluation of the effectiveness of EU Intellectual property course at SAU in Nitra

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ABSTRACT

Education in the field of intellectual property rights can have a positive effect on their ability to be employed and can provide relevant information considering the student choice and indirectly measure the quality of higher education. We decided to supply the course EU Intellectual Property for students at Slovak University of Agriculture (SUA) in Nitra. We had more than 100 graduated students during the two years of the course. Nowadays, we need feedback on the effectiveness of the course based on the exam results. We found out that the most of students are interesting in the issues of EU Intellectual Property and are able to do their exam with the mark A or B. There are no statistically significant differences between the students base on the study programmes; however, the statistical significant differences were proved among the students by the form of study. The full-time form appears to be the most appropriate form of study. Moreover, creativity of students evaluated by the seminar papers lags behind their theoretical knowledge proved by tests. It is an important fact mainly at the course of the EU Intellectual Property where the creativity is one of the most important elements. The article can be used as an example how to measure the quality of higher education by statistical methods.

KEYWORDS: EU Intellectual Property, European Union, new course, exam results, parametric and non-parametric statistical tests

JEL CLASSIFICATION: C12, K11, O34

INTRODUCTION

Innovation is a key component of the growth strategy adopted by the European Union and characterised by the creation of a more competitive economy with higher employment. The achievement of this aim depends on different factors and one of them is undoubtedly an

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efficient system of intellectual property rights [11]. The system of EU Intellectual Property includes copyrights, patents, utility models, designs, topography of semiconductor, breeder's right, trademarks, geographical indications and traditional specialities guaranteed. This system of Intellectual Property Rights has been gaining considerably in importance for businesses in many key industries to ensure economic competitiveness [20]. Intellectual Property Rights - intensive industries generated 27.8% of all jobs in the EU during the period 2011-2013, they pay significantly higher wages than other industries and have proved most resilient to the economic crisis [8]. On the other hand, the mere filing of an Intellectual Property right is not sufficient to trigger growth, but it can signal a firm's stronger ability to sustain growth through the creation, protection and exploitation of intellectual assets [12].

Intellectual property plays a vital role in promoting innovation as it provides those who invest time, effort and money in innovation with a mechanism to protect and benefit from it [9]. Intellectual property management is a key element in improving the competitiveness of any company. Unfortunately, SMEs do not benefit from open innovation or from patenting in the same way as larger firms in spite of their importance for economic welfare and innovation in Europe [4]. Reasons why SMEs do not take any measures to protect their innovation are not seeing any benefit in protecting innovations (35%), lack of knowledge on how to protect innovations (13%) and the cost of procedures (10%). There were the top three reasons why SMEs do not protect their innovation [7]. Three years later, the EUIPO repeated its research. The results reveal that the main reason, for all sizes of SMEs, is a lack of sufficient knowledge that is, what Intellectual property is and how do we register it (38%) [9]. Many other researchers confirm that resource shortages and lack of Intellectual Property management practices are some of the barriers faced by SMEs [6; 14; 15; 16].

Moreover, according to the study of EUIPO [7] just as in 2013, the youngest generation reports the lowest level of 'good' understanding in comparison with other age groups, and this level of understanding is decreasing: 64 % of the Europeans surveyed aged 15 to 24 report an overall good understanding of Intellectual Property, compared with 68 % in 2013. In addition, 21% of 15 to 24 year olds say they intentionally use illegal sources of digital content and 13% say they have intentionally bought counterfeits in the past 12 months [10]. Today, too many graduates start their first job without ever having studied anything about Intellectual Property Rights. A combination of lecture modules, practical cases and a compulsory Intellectual Property Rights part in all Master's projects would build Intellectual Property Rights awareness and competence for the future graduates [18]. However, there are few higher education programmes dedicated to Intellectual Property Rights management [18].

The courses oriented on the intellectual property were missing also at SUA. The issues linked to the intellectual property were mentioned also within other courses as marginal matter (e.g. Commercial law, EU Business Law, etc.). Therefore the Department of Law within the cooperation of the Department of European Policies at the Faculty of European Studies and Regional Development of SUA in Nitra filled the application of Jean Monnet Module project focused on the EU intellectual Property. The project was approved and the new course EU Intellectual Property was introduced as optional course in master programmes at the Faculty of European Studies and Regional Development. During two years there were 130 students who graduated in the new course. The aim of this paper is to find out which group of students is the most successful at this course by the various criteria such as year of study, sex, form of study, study programmes. The result of the exam consists of two parts: results of seminar papers and results of tests. Therefore we looked for if there are statistically significant

differences among the results of seminar papers that declare higher creative potential than results of tests created by theoretical questions. For this purpose we use the parametric and non-parametric tests of statistical induction described below.

MATERIAL AND METHODS

The new course EU Intellectual property has been taught at SUA for two years within the project of Jean Monnet Module EU Intellectual Property no. 599683-EPP-1-2018-1-SK-EPPJMO-MODULE. The course was graduated by 130 students of master study programmes at Faculty of European Studies and Regional Development; of it 57 students in study programme Rural Development and Development of Rural Tourism and 73 students in study programme Regional Development and Policies of the EU. In the first year (2018), there were 60 students and in the second year (2019), there were 70 students; of it, 99 females and 31 males. Most of the students were enrolled in the present form of study (86 students), only 22 students visited the external form of study and 22 students visited individual form of study. To achieve the aim of this paper we looked for the statistically significant differences in the exam results among the students according to the above mentioned criteria such as sex, form of study, study programmes. We use the parametric tests of statistical inductions, z-test.

The statistical value is as follows:

$$u = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{n_2 \sigma_1^2 + n_1 \sigma_2^2}} \sqrt{n_1 n_2}$$

The critical value is stipulated by excel function NORMSINV, which returns the inverse of the standard normal cumulative distribution [19].

The statistical significant differences were observed also among the three forms of studies; however there were only 22 students in external and individual form of studies, since the measured values did not have a normal distribution; therefore we used the non-parametric Kruskal – Wallis test expressed as follows by the relation:

$$H = \left(\frac{12}{N(N+1)} \cdot \sum_{j=1}^k \frac{R_j^2}{n_j} \right) - 3 \cdot (N+1)$$

H – Test statistics of Kruskal -Wallis test,

N – Number form of studies,

R_j – Order for each form of study,

n_j – Number of observations in each form of studies,

k – Number of forms of studies.

The potential statistically significant differences are analyzed by the tests of contrasts available in program Statgraphics, mainly Fischer LSD test which confirms the statistically significant differences between two average values of objects included into a particular group expressed as follows:

$$|\bar{y}_i - \bar{y}_j| \geq t_{\alpha, m(n-1)} \sqrt{\frac{2s_r^2}{n}}$$

where $\alpha, m(n - 1)$ is the critical value of t -distribution with $m \cdot (n - 1)$ degrees of freedom.

Moreover, we compared also the partial results of the exam; i.e. the results from the seminar papers and the results from the written test. We used the t -test paired two sample for means available in excel expressed as follows:

$$t = \frac{\bar{d}}{s_d}$$

where

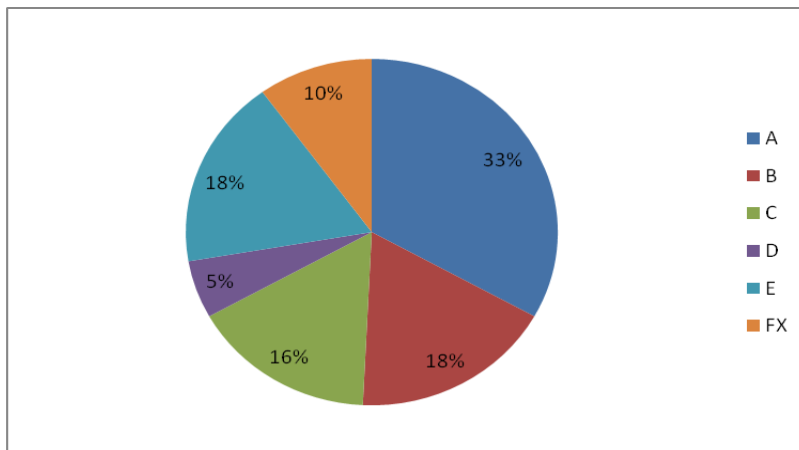
$$\bar{d} = \sum_{i=1}^n d_i, \quad d_i = x_{2i} - x_{1i}, \quad s_d = \sqrt{\frac{\sum (d_i - \bar{d})^2}{n(n-1)}}$$

The critical value is expressed by function TINV which calculates the inverse of the two-tailed Student's t -distribution, which is a continuous probability distribution t at the α level 0.05 and $(n - 1)$ degrees of freedom [19].

RESULTS AND DISCUSSION

The course EU Intellectual Property visited 130 students in the year 2018 and 2019. The results of exams are documented in figure 1. The most of students received mark A; despite the fact, that mark A is the most often appeared mark among the students, it received only 33% of all students. The average value of all marks is 1.985 (C) but 50% of all students received mark A or B. The standard deviation is 0.986; it means that the most of marks range from A to E, what indicates that the marks are spread out over a wider range.

Figure 1 Results of exam received by all students in percentage



Source: own calculations

We looked for the statistically significant differences among the males and females. The table 1 represents the distribution of students by sex.

Table 1 Exam results received by males and females

Mark	All students	Males		Females	
		number	percentage	number	percentage
A	43	7	16.28	36	83.72
B	23	7	30.43	16	69.57
C	21	3	14.29	18	85.71
D	7	2	28.57	5	71.43
E	23	7	30.43	16	69.57
FX	13	5	38.46	8	61.54

Source: own calculations

To find out the statistically significant differences we used z-test.

According to the results the value of test statistics $z = 1.57 < z_{crit} = 1.96$ with $p\text{-value} = 0.12 \geq \alpha = 0.05$; null hypothesis (the hypothesis that, there are no statistically significant differences between the observed variables) we do not reject, that means that we can conclude that there are no statistically significant differences between the exam results for men and women. The average mark for men is 2.24 and for women it is 1.90.

Secondly, we compared the exam results of students who graduated the course EU Intellectual property in 2018 with the students who graduated in 2019. The table 2 represents their distribution.

Table 2 Exam results for students in 2018 and 2019

Mark	All students	2018		2019	
		number	percentage	number	percentage
A	43	21	48.84	22	51.16
B	23	6	26.09	17	73.91
C	21	8	38.10	13	61.90
D	7	2	28.57	5	71.43
E	23	19	82.61	4	17.39
FX	13	4	30.77	9	69.23

Source: own calculations

To find out the statistically significant differences we used z-test. According to the results the value of test statistics $z = 0.88 < z_{crit} = 1.96$ with $p\text{-value} = 0.38$. Whereas the probability value $p \geq \alpha = 0.05$; therefore, we do not reject the tested hypothesis and we can conclude that there are no statistically significant differences between the exam results for students who

graduated in 2018 and 2019. The average mark for who students graduated in 2018 is 2.07 and for students graduated in 2019 is 1.91.

Thirdly, we compared the exam results of students by the study programmes. The students were enrolled in master study programme Rural Development and Development of Rural Tourism (hereinafter as RDDRT) and master study programme Regional Development and Policies of the EU (hereinafter as RDPEU). The table 3 represents their distribution.

Table 3 Exam results for students of different master study programmes

Mark	All students	RDDRT		RDPEU	
		number	percentage	number	percentage
A	43	27	62.79	16	37.21
B	23	5	21.74	18	78.26
C	21	10	47.62	11	52.38
D	7	1	14.29	6	85.71
E	23	8	34.78	15	65.22
FX	13	6	46.15	7	53.85

Source: own calculations

To find out the statistically significant differences we used z-test.

According to the results the value of test statistics $z = -1.45 < z_{crit} = 1.96$ with $p\text{-value} = 0.15 \geq \alpha = 0.05$; therefore we can state that there are no statistically significant differences between the exam results for students enrolled in different study programmes. The average mark for students of RDDRT is 1.84 and for students of RDPEU is 2.10.

Fourthly, we compared the exam results of students by the form of study (full time, external and individual form of study). The table 4 represents their distribution.

Table 4 Exam results for students of different form of study

Marks	All students	Full time form		External form		Individual form	
		number	percentage	number	percentage	number	percentage
A	43	42	97.67	0	0.00	1	2.33
B	23	16	69.57	0	0.00	7	30.43
C	21	13	61.90	3	14.29	5	23.81
D	7	4	57.14	0	0.00	3	42.86
E	23	4	17.39	18	78.26	1	4.35
FX	13	7	53.85	1	7.69	5	38.46

Source: own calculations

Since the measured values did not have a normal distribution; due to only 22 students in external and individual form of study, therefore we used the non-parametric Kruskal – Wallis

test to find out the statistically significant differences. To calculate the KW statistics we used the programme Statgraphics plus. According to the results KW statistics $H = 38.86 > z_{\text{crit}} = 5.99$ with $p\text{-value} = 3.64 \times 10^{-9} < \alpha = 0.05$; whereas the probability value p is less than 0.05, we reject the null hypothesis and we can conclude that there are statistically significant differences among the exam results for students of different form of study. The average mark for full-time students is 1.65; for external students 2.91 and for students with individual form of study is 2.36. The statistically significant differences were confirmed by LSD test between all pairs of form of study. The students of external or individual forms of study do not usually have enough time to prepare more precise for the exams due to their job or family duties.

Moreover, we are interested in the form of exam which is more acceptable for students. The result of exam consists of two parts: results of two seminar papers and results of two tests. The seminar papers are related to the copyright licence agreement and application of trade mark at the particular state body with the obligation to prepare a short project for trademark. The tests consisted of open questions which asked for short but precise answers related to the theory of EU intellectual property. Therefore we looked for if there are statistically significant differences among the results from seminar papers that declare higher creative potential than results from tests with theoretical questions. We tested 58 students who graduated the course in 2019. We excluded the students with FX and students which repeated the exam. The results are documented in table 5.

Table 5 Number of students with the partial exam results

Mark	Partial results from tests	Partial results from seminar papers
A	17	15
B	10	7
C	14	16
D	13	0
E	4	9
FX	0	11

Source: own calculations

The measured values fulfilled the conditions for the use of parametric test since the measured values had a normal distribution. To find out the statistically significant differences we used the parametric t - test paired two samples for means available in excel. By using the t -test we have calculated the value of test statistics. According to the results $t = 2.80 > t_{\text{crit}} = 2.00$ with a probability value $p\text{-value} = 0.007 < \alpha = 0.05$. According to the results KW statistics $H = 38.86 > z_{\text{crit}} = 5.99$ with $p\text{-value} = 3.64 \times 10^{-9} < \alpha = 0.05$; whereas the probability value p is less than 0.05, we reject the null hypothesis and we can conclude that there are statistically significant differences between the partial exam results from seminar paper and from tests. The average mark from seminar papers is 2.22 and from tests is 1.80. The results proved that the students on average are able to accept the theoretical knowledge; however their effort to use it in practice is quite small. It is a very important finding though not very satisfactory that the students' creativity lags behind their theoretical knowledge.

CONCLUSIONS

Intellectual Property refers to unique, value-adding creations of the human intellect that result from human ingenuity, creativity and inventiveness [15]. The EU Intellectual Property has a strong impact on market leadership and the overall performance of a company [2] and is an important instrument for profiting from innovation [1]. Knowledge and IP management competencies are crucial to implementing and executing the open strategies successfully [3]. On the other hand, there is only a limited defensibility of such rights in juridical disputes because of high costs and time investments [4]. Therefore, to advance the cause of the rights and wrongs of the laws that promote and protect intellectual property at the national and international levels, education in intellectual property is required and must be advocated [17]. Training and education are a crucial component of a well-functioning and balanced IP system [5]. Typically, IP education is available only in law school (courses are limited there as well) and for librarians, teachers, and others who deal directly with potential IP litigation in the course of their jobs. Even basic education for the lay person about the field of IP is not always available [17]. Therefore we decided to supply the course EU Intellectual Property to students at Slovak University of Agriculture to receive at least basic knowledge on EU Intellectual Property and legal measures how to protect it. We found out that the most of students are interesting in the issues of EU Intellectual Property and are able to do their exam with the mark A or B. There are no statistically significant differences between the students by the sex, study programme or year of course graduation. However, the statistically significant differences were proved among the students by the form of study. The full-time form appears to be the most appropriate form of study. Moreover, the creativity of students evaluated by the seminar papers lags behind their theoretical knowledge proved by tests. It is an important fact mainly at the course of EU Intellectual Property where creativity is one of the most important elements. We should put a higher accent on the creative tasks on the lessons. The use of mathematical-statistical methods significantly contributed to the evaluation of the subject.

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