

The Role of the Academic Community in Defining the Professional Route: Students' Perception

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A survey regarding the student's perception on the academic community on some issues was conducted at Technical University of Cluj-Napoca on a sample of 403 students using a stratified random sampling procedure.

The student's perception about the role of academic community in defining the professional route was investigated. The study revealed that the perception of students separates the academic community in populations with different involvement degree (academic staff, faculty and department staff, student organizations, teachers and colleagues). The perception of the students is related with the distance between observer and the observable.

Keywords: Student t test, Jarque-Bera test, academic community, support, perception, expectation.

Роль наукової спільноти у визначенні професійних Маршрут: Сприйняття студентів

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Обстеження плані сприйняття студентів на наукових кіл з деяких питань було проведено у Технічному університеті міста Клуж-Напока на вибірці з 403 студентів, використовуючи процедуру стратифікованої випадкової вибірки. Було досліджено сприйняття студента про роль академічної спільноти у визначенні професійного шляху. Дослідження показало, що сприйняття студентами відокремлює академічної спільноти в групах населення з різним ступенем участі (академічний персонал, викладачі та співробітники Департаменту, студентських організацій, викладачі та колеги). Сприйняття студентів пов'язане з відстанню між спостерігачем і контрольоване.

Ключові слова: студент г-тест, Харке-Бера випробувань, академічна спільнота, підтримки, сприйняття, очікування.

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Роль научного сообщества в определении профессиональных Маршрут: Восприятие студентов

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Обследование плане восприятия студентов на научных кругов по некоторым вопросам был проведен в Техническом университете города Клуж-Напока на выборке из 403 студентов, используя процедуру стратифицированной случайной выборки.

Было исследовано восприятие студента о роли академического сообщества в определении профессионального пути. Исследование показало, что восприятие студентами отделяющей академического сообщества в группах населения с различной степенью участия (академический персонал, преподаватели и сотрудники Департамента, студенческих организаций, преподаватели и коллеги). Восприятие студентов связано с расстоянием между наблюдателем и наблюдаемым.

Ключевые слова: студент г-тест, Харке-Бера испытаний, академическое сообщество, поддержки, восприятие, ожидание.

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Introduction

The educational system in Romania was reformed since the communism system was broken at the end of 1980s'. Romanian educational system had three objectives in the communism era: to create good socialist citizens, to form individuals with high productivity and to maintain equality in society (Offe, 1997). The communism educational system in Romania was characterized by low level of drop-outs and well performing in theoretical fields but no link to knowledge and innovative market oriented system (Sadlak, 1991).

The Romanian higher education known major changes after 1989 due to the large number of people from past high-school graduates generations whose aspiration to get a university degree and to the opportunities offered by the Open Society (Crişan, 2000) and international programmes (Temple, 2006).

The Romanian higher education system was put in the situation of reconsider and rebuilds its vision, mission and strategy also in the view of the Bologna principles. The reform process of higher education was constructed to meet the future challenges since there is no Europe-wide model for the organization of higher education systems (Scott, 1996).

Today, higher education is offered in public and private (Reisz, 1997) higher education institutions that are coordinated by the Ministry of Education and Research (through its agencies: The National Rectors Council; National Council for Higher Education Financing, and National Council for Scientific Research in Higher Education). The Ministry control of the universities was reduced (Marga, 1998) allowing inclusive the autonomy on the tuition fees (Miroiu and Dinca, 1999). The higher education institutions in Romania must be accredited by the Romanian Agency for Quality Assurance in Higher Education and must respect quality assurance measures (Emergency Ordinance on Quality Assurance in Education, no. 75/2005) (Pollitt, 1993).

The changes in the Romanian higher education were made also in respects of European Space of Education and of Bologna Declaration (Bologna Declaration, 1999) towards development of the European dimension in education, encouraging the mobility of students and teachers, promoting co-operation between educational institutes, encouraging the exchange of information and experiences, and encouraging the development of distance education.

The higher education institutions provide that kind of education able to builds on the level of competence, knowledge and skills According to Farrington (Farrington, 2000) Romanian and Russia provide the French or Napoleonic model of university with strict and hierarchical state subordination. How the student relates to the universities and academic environment is a subject of interest for any university. In Romania, the student has a legal relationship with his/her higher education institution which specifies the national rights and obligations (Law on Education, 1995). Each university aimed to motivate the student's desire or willingness to engage and persist in

academic activities in school (Brophy, 1986) even they are under a high risk do not take the studies seriously (Steinberg, 1996). The student must be integrated in the academic environment taking into account his/her value systems, traditions and beliefs (Rokeach, 1973). Information about the students' outlook regarding the support perceived from academic community is a key element for defining the objectives of a good strategic management (Anderson and Kumari, 2009; King, 2009). However, according to Cothran and Ennis (Cothran and Ennis, 2000) we know just few information about what students think about school and engagement. In order for meaningful reform in higher education to take shape it became essential to listen to the student perspective.

A survey study regarding the student's perception about the support from academic community in self-defining of the professional route was conducted at Technical University of Cluj-Napoca, Romania; the collected data were analyzed and the results are presented here.

Material and Method

The survey was conducted at Technical University of Cluj-Napoca, located in Cluj County in north-western Transylvania. It is a technical university, the second largest state universities in the city. Nine faculties (all in Romanian and some sections also in English) provide training and education on engineering sciences (architecture, mechanical, electrical and civil engineering) at Technical University of Cluj-Napoca. The survey was conducted in the first semester of 2008-2009 academic year on a stratified random sample of 437 students. The percent of students from each faculty according to the percent from all student of university was first calculated. The year of study for each faculty was randomly chosen. The specialties for the included year of study according with the faculty were chosen. The group or groups of students (the students into a group vary from 7 to 21) included into the study was also randomly chosen according to the specialty, year of study and faculty.

The aim of the research was presented to the students and they were asked to fill the questionnaire whenever they were agreeing to participate at the survey.

The following question was analyzed in the study *How you appreciate the support given to define your professional route from the following actors of the academic community?: A. Academic staff; B. Faculty Staff; C. Department Staff; D. Teachers; E. Student associations; F. Colleagues*. The students were asked to quantify the support for each actor on a scale of None – Small – Medium – High – Highest.

The analysis of the obtained data was performed on the valid answers. Two objectives were analyzed: the assumptions and the distribution of the support degree.

The main assumption was that there exist an association between the support and actors from academic community in the view of student perception. The type of distribution of each defined actor was investigated; also there was investigated if the quantification of the degree of implication followed the same distribution for the studied actors. The association between the degree of support and the actors

of academic community was investigated using the homogeneity/independence Chi-Square. The expected values (abbreviated as $E_{i,j}$, in our case $1 \leq i, j \leq 5$) were computed using the formula presented in Eq(1) (Fisher, 1925).

$$E_{i,j} = \frac{\left(\sum_{k=1}^5 O_{i,k}\right)\left(\sum_{k=1}^5 O_{k,j}\right)}{\sum_{i=1}^5 \sum_{j=1}^5 O_{i,j}} \quad (1)$$

where $O_{i,j}$ = observed counts in contingency table (i = encodes the category of academic community; j = encodes the degree of support as None-Small-Medium-High-Highest).

The binomial distribution of the students perception was applied in order to obtained the true proportion in the population and to compare with the results obtained in the investigated sample.

The second objective was investigated as seen the degree of implication as a continuous variable with an unknown mean and variance (to be determined). Also the distribution law of the degree on involvement was analyzed from the perspective of an uniform scale: None = 0, Small = 1; Medium = 2, High = 3 and Highest = 4. A more accurate approach it was considered; an unknown expectation for the highest category was used.

The Jarque-Bera's test (Jarque and Bera, 1981) abbreviated as JB was applied under normality assumption to find the best values for the means (μ_i , $i = 0$ for *Academic Staff*, 1 for *Faculty Staff*, 2 for *Department Staff*, 3 for *Teachers*, 4 for *Student Associations*, 5 for *Colleagues*) (see Eq(4)). Under the assumption that the None = 0, Small = 1, Medium = 2, High = 3, and Highest = E_i) the formulas for population skewness (Sk_i) and Kurtosis (Ku_i) are presented in Eq(2) and Eq(3) (where n_i = number of observations in each sample):

$$Sk_i = \frac{n_i \sqrt{n_i - 1}}{n_i - 2} \frac{O_{i,4}(E_i - \mu_i)^3 + \sum_{j=0}^3 O_{i,j}(j - \mu_i)^3}{\left(O_{i,4}(E_i - \mu_i)^2 + \sum_{j=0}^3 O_{i,j}(j - \mu_i)^2\right)^{3/2}} \quad (2)$$

$$Ku_i = \frac{(n_i + 1)n_i(n_i - 1)}{(n_i - 2)(n_i - 3)} \left(\frac{O_{i,4}(E_i - \mu_i)^4 + \sum_{j=0}^3 O_{i,j}(j - \mu_i)^4}{\left(O_{i,4}(E_i - \mu_i)^2 + \sum_{j=0}^3 O_{i,j}(j - \mu_i)^2\right)^2} - \frac{3(n_i - 1)}{n_i(n_i + 1)} \right) \quad (3)$$

The Jarque-Bera's statistic for the populations is given in Eq(4) and depends on E_i (populations expectances) and μ_i (populations means):

$$JB_i = \frac{n_i}{6} \left(Sk_i^2 + \frac{Ku_i^2}{4} \right) \quad (4)$$

Results and Discussion

The aim of the research was presented at a number of 437 students. 403 students were agree to participate to the study and filled the questionnaire. The distribution of the answers expressed as absolute frequencies are presented in Table 1. Juts the valid answers were included in analysis (for each community a ration of 93% of valid answers was seen, with one exception represented by the *Department Staff* were a ratio of 91% of valid answers was identified).

Table 1. Contingency of students perception regarding the support from academic community on defining the professional route

Community	Quantification of support					Total
	None	Small	Medium	High	Highest	
Academic Staff	120	145	75	28	6	374
Faculty Staff	107	138	83	32	13	373
Department Staff	75	100	125	58	9	367
Teachers	64	103	125	66	18	376
Student Associations	121	130	85	26	14	376
Colleagues	34	70	120	122	27	373

The Chi Square test was applied on the data from Table 1 in order to analyze the association between the support and the community through student’s perception. In this analysis, the support was considered as categorical variable obtained through observation of students perception in quantification of different communities in defining the professional route. The results of the Chi Square statistic (X^2) are given in Table 2.

Table 2. Chi Square statistic results on contingency between academic community and their involvement

X^2	None	Small	Medium	High	Highest	Σ	$P\chi^2$
Academic Staff	12.5	8.1	7.3	13.6	5.0	46	$2 \cdot 10^{-9}$
Faculty Staff	4.7	4.9	3.6	9.8	0.2	23	$1 \cdot 10^{-4}$
Department Staff	1.3	1.4	6.0	0.2	1.9	11	$3 \cdot 10^{-2}$
Teachers	6.3	1.3	4.7	1.9	0.8	15	$5 \cdot 10^{-3}$
Student Associations	12.8	1.9	3.1	15.9	0.0	34	$8 \cdot 10^{-7}$
Colleagues	32.1	17.2	3.1	80.4	10.8	144	$5 \cdot 10^{-30}$
Σ	70	35	28	122	19	273	$3 \cdot 10^{-46}$

$P\chi^2(\Sigma X^2, df, 2)$: the probability from Chi Square distribution to observe a distance from agreement larger than observed (ΣX^2)
 $df = 4$ for every role (Σ) and $df = 20$ for entire community ($\Sigma\Sigma$)

The analysis of the results presented in Table 2 revealed that there is no relationship between the academic role and students opinions about their support. Moreover, the association is assured for each academic community (Table 2, $p\chi^2$ column).

One more assumption should be verified in order to compare the perceptions: the binomial distribution of perception. The true proportions into the populations can be obtained (see Table 3) using uniform category values (None = 0; Small = 1; Medium = 2; High = 3; and Highest = 4) and a binomial approximation of the distribution

Table 3. Proportions for perception of academic community support

Support	p (N=4)	X ²	Pχ ² (X ² ,3)
Academic Staff	0.269	14.6	2·10 ⁻³
Faculty Staff	0.301	40.5	9·10 ⁻⁹
Department Staff	0.381	17.8	5·10 ⁻⁴
Teachers	0.414	17.7	5·10 ⁻⁴
Student Associations	0.289	61.3	3·10 ⁻¹³
Colleagues	0.525	20.6	1·10 ⁻⁴

p: True proportion in population;
 Pχ²(ΣX²,df,2): the probability from Chi Square distribution to observe a departure from agreement larger than observed one

The results presented in Table 3 showed that by using a uniform scale for category values we are in error, being hard to reject binomial or normal assumption for the students' perceptions. Thus, a different approach was conducted. It was assumed that the last category (Highest) may have different perception (and thus different category value); its value was assigned with the expectation value of the support. Moreover, the expectation is supposed to be different from one population to another. The mean and the variance of expectation under assumption that the populations are normal distributed were computed.

It's well known that JB statistic has a Chi Square with two degrees of freedom distribution.

The values for E_i and μ_i were obtained under the assumption of normal distribution (when skewness and kurtosis converge to 0. In this conditions, the JB's statistic could be minimized by using Eq(5).

$$JB_i(\mu_i, E_i) = \min. \Leftrightarrow \frac{\partial JB_i(\mu_i, E_i)}{\partial \mu_i} = 0 = \frac{\partial JB_i(\mu_i, E_i)}{\partial E_i} \tag{5}$$

The obtained solutions for the Eq(5) are presented in Eq(6)-Eq(11).

$$JB_0 = \min. \Rightarrow JB_0 = 5.0 \cdot 10^{-3}; \mu_0 = 1.44; E_0 = 4.90 \tag{6}$$

$$JB_1 = \min. \Rightarrow JB_1 = 1.5 \cdot 10^{-3}; \mu_1 = 1.72; E_1 = 5.16 \tag{7}$$

$$JB_2 = \min. \Rightarrow JB_2 = 7.8 \cdot 10^{-3}; \mu_2 = 1.72; E_2 = 4.94 \tag{8}$$

$$JB_3 = \min. \Rightarrow JB_3 = 4.2 \cdot 10^{-3}; \mu_3 = 1.98; E_3 = 5.05 \tag{9}$$

$$JB_4 = \min. \Rightarrow JB_4 = 4.4 \cdot 10^{-3}; \mu_4 = 1.76; E_4 = 5.38 \tag{10}$$

$$JB_5 = \min. \Rightarrow JB_5 = 3.9 \cdot 10^{-4}; \mu_5 = 2.26; E_5 = 4.88 \tag{11}$$

The analysis of the Eq(6)-Eq(11) revealed that all other JB statistics are very good, the models being an improvements of models from Table 3. For Eq(6)-Eq(11) the highest probability for being in error was obtained by Eq(8) and was smaller that 4%.

The results presented in Eq(6)-Eq(11) revealed that the greatest support expectation of students is from *Student Organizations* (E₂ = 5.38) and the lowest expectation is from *Colleagues* (E₂ = 4.88).

The obtained values of means and expectations were used in order to apply a mean comparison test. The Student t test (Student, 1908) was used, its modification for different variances and sample

sizes (Welch, 1947) (see Eq(12)), where s_i should be expressed as departures from known means (μ_i) as in equation (12):

$$t_{i,j} = \frac{\mu_i - \mu_j}{\sqrt{\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}}}, \quad df_{i,j} = \frac{\left(\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}\right)^2}{\left(\frac{s_i^2}{n_i}\right)^2 / (n_i - 1) + \left(\frac{s_j^2}{n_j}\right)^2 / (n_j - 1)} \quad (12)$$

where $s_i^2 = O_{i,4}(E_i - \mu_i)^2 + \sum_{j=0}^3 O_{i,j}(j - \mu_i)^2$.

The summary of the results for means (μ_i), expectances (E_i) and variances (s_i^2) are presented in Table 4.

Table 4. Expectances, means, and variances for support from different communities in defining professional route of students through their perspective

Expected	Expectance	Mean	Variance
Academic Staff	4.9	1.44	1.18
Faculty Staff	5.16	1.72	1.62
Department Staff	4.94	1.72	1.29
Teachers	5.05	1.98	1.57
Student associations	5.38	1.76	1.81
Colleagues	4.88	2.26	1.47

The probabilities with which pairs of academic communities had no different population mean are presented in Table 5.

Table 5. Probabilities from Student t distribution for support in defining professional route of students through student's perspective

	Aca	Fac	Dep	Tea	Sta	Col
Academic Staff	1					
Faculty Staff	$1 \cdot 10^{-3}$	1				
Department Staff	$6 \cdot 10^{-4}$	1	1			
Teachers	$5 \cdot 10^{-10}$	$5 \cdot 10^{-3}$	$3 \cdot 10^{-3}$	1		
Student Association	$4 \cdot 10^{-4}$	$6.8 \cdot 10^{-1}$	$6.6 \cdot 10^{-1}$	$2 \cdot 10^{-2}$	1	
Colleagues	$4 \cdot 10^{-21}$	$4 \cdot 10^{-9}$	$7 \cdot 10^{-10}$	$2 \cdot 10^{-3}$	10^{-7}	1

Aca: Academic staff; Fac: Faculty staff;
 Dep: Department staff; Tea: Teachers
 Sta: Students associations; Col: Colleagues

The analysis of data presented in Table 5 revealed that with a 5% risk of being in error we cannot reject the hypothesis that the mean of support in defining professional route of students for *Faculty* and *Department Staff* is the same with the mean of support in defining professional route of students given by the *Student Associations* (the probability of observing better agreement is 68% and 66%, respectively). We cannot reject the hypothesis that the mean of support in defining professional route of students for *Faculty Staff* is the same with the mean of support given by *Department Staff* (the probability of observing better agreement is near 0%) though student's perspective.

The figure 1 plots the density probability functions of student's perception of support in defining personal professional route from different academic communities, using the values from Table 4.

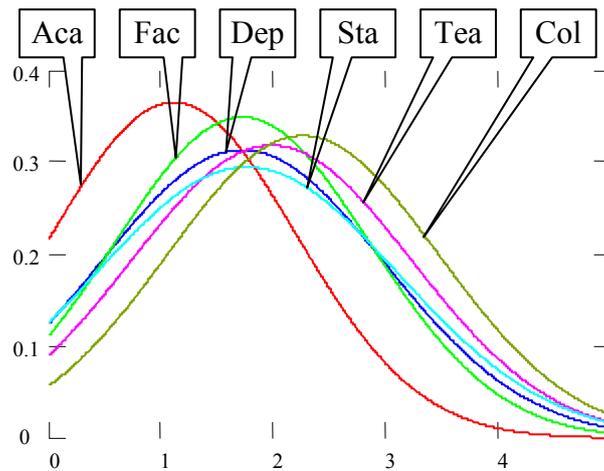


Figure 1. Density probability functions (PDFs) for student's perception of professional route support from different academic communities (Aca: *Academic Staff*, Fac: *Faculty Staff*, Dep: *Department Staff*, Tea: *Teachers*, Sta: *Student Associations*, Col: *Colleagues*)

The analysis of the obtained results led to the following remarks:

- Regarding the defining of the professional route of the students, their perception of support from academic communities (by population means) could be descending classified as: *Colleagues* ($\mu = 2.26$), *Teachers* ($\mu = 1.98$), *Student Organizations* ($\mu = 1.76$), *Faculty and Department Staff* ($\mu = 1.72$), and *Academic Staff* (1.44).
- Regarding the defining of the professional route of the students, their expectations of support it sort academic communities (by population expectations) as follows: *Students Associations* (5.38), *Faculty Staff* (5.16), *Teachers* (5.05), *Department Staff* (4.94), *Academic Staff* (4.9), and *Colleagues* (4.88).
- Regarding the defining of the professional route of the students, their perception of support variability it sort academic communities (by population variances) as follows: *Student Associations* (1.809), *Faculty Staff* (1.615), *Teachers* (1.569), *Colleagues* (1.465), *Department Staff* (1.289), and *Academic Staff* (1.181).

Conclusions

The present study revealed that students had different expectations for involvement in professional route of different academic communities.

Most often students enrolled at Technical University of Cluj-Napoca received help in defining their professional route from colleagues and teachers.

The greatest expectations of the students enrolled at Technical University of Cluj-Napoca in receiving support for defining professional route comes from student associations and faculty staff;

none of them were not identified as being between the first two academic communities from which the students actually received this kind of help.

The smallest variability in the student's point of view when defining the professional route was analyzed was observed at academic staff. The population characterized by the students as the smallest expectation and offering help in defining the professional route that proved to had the highest variability is student associations.

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