Students Perception of Degree of Academic Community Involvement in Academic Life

Article *in* Actual Problems of Economics · January 2009

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STUDENTS PERCEPTION OF DEGREE OF ACADEMIC COMMUNITY INVOLVEMENT IN ACADEMIC LIFE

This survey on the students' perception of the academic environment was conducted at Technical University of Cluj-Napoca. A sample of 403 students was included in the analysis using a stratified random sampling procedure by year of study, department and specialty. The academic community involvement of four main actors represented by academic staff, department staff, teachers and administrative personnel was analyzed in the light of students' perception. The results of the study showed that students percept three degrees of academic community involvement (academic staff and administrative personnel, department staff, teachers and students). This perception is related with the distance between the observer and the observable.

Keywords: *Student t test; Jarque-Bera test; academic community; involvement degree; perception; expectation.*

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СТУДЕНТСЬКЕ СПРИЙНЯТТЯ РІВНЯ ЗАЛУЧЕННЯ АКАДЕМІЧНОЇ СПІЛЬНОТИ В АКАДЕМІЧНЕ ЖИТТЯ

Дане дослідження стосовно студентського сприйняття академічного середовища було проведене на базі Технічного університету м. Клуі-Напока (Румунія). Опитування 403 студентів були проаналізовані за допомогою типової довільної вибірки за роком навчання, факультетом та спеціальністю. Залучення 4 головних груп академічної спільноти – наукові співробітники, адміністрація, викладачі та керівництво факультетів – було проаналізовано в світі їх студентського сприйняття. Результати дослідження продемонстрували, що студенти виділяють 3 рівні залучення академічної спільноти (науковці та адміністрація, керівництво факультетів, викладачі та студенти). Таке сприйняття пов'язане з дистанцією між спостерігачем та об'єктом.

Ключові слова: *критерій Стьюдента, тест Жак-Бера, академічна спільнота, рівень залучення, сприйняття, очікування.*

Форм. 12. Табл. 5. Рис. 1. Літ. 14.

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СТУДЕНЧЕСКОЕ ВОСПРИЯТИЕ УРОВНЯ ВОВЛЕЧЕНИЯ АКАДЕМИЧЕСКОГО СООБЩЕСТВА В АКАДЕМИЧЕСКУЮ ЖИЗНЬ

Данное исследование студенческого восприятия академической сферы было проведено на базе Технического университета г. Клуи-Напока (Румыния). Опрос 403 студентов был проанализирован при помощи типической произвольной выборки по году обучения, факультету и специальности. Вовлечение 4 главных групп академического сообщества – научные сотрудники, администрация, преподаватели и руководство факультетов – было проанализировано в свете студенческого восприятия. Результаты исследования показали, что студенты выделяют 3 уровня вовлечения академического сообщества (научные сотрудники и администрация, руководство факультетов, преподаватели и студенты). Такое восприятие связано с определенной дистанцией между наблюдателем и наблюдаемым.

Ключевые слова: *критерий Стьюдента, тест Жак-Бера, академическое сообщество, уровень вовлечения, восприятие, ожидание.*

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Introduction. Students, as individuals, know their own attitudes, emotions, and other internal states partially by inferring between observations of their own behavior and/or circumstances in which this behavior occurs (Bem, 1967). They may infer some of their own traits by observing others with whom they feel a sense of merged identity (Goldstein and Cialdini, 2007). These demonstrate that the student's view of himself/herself is in direct relation with the observation of how others within their close environment behave.

Motivation to learn is a student's desire or willingness to engage and persist in academic activities in school (Brophy, 1986) even they are under a high risk of not taking school or their studies seriously (Steinberg, 1996).

Under this auspices knowing more about the students opinion regarding the involvement in the academic community is a key element for defining the objectives of strategic management in education.

The higher education institutions are confronted with an explosion of control measures, steering mechanisms and increasing accountability pressures (Pollitt, 1993) compared to the autonomy era (Hood, 1995). Thus, New Public Management advocates the adoption of private management instruments within public sector organizations in order to increase efficiency, effectiveness and quality (Hood, 1991; Bach, 2000; Ferlie and Steane, 2002).

Cothran and Ennis highlight that very little information is known regarding what students think about schooling and engagement (Cothran and Ennis, 2000). The student perspective is essential and their opinion must be listened to in order to increase the likelihood of their own engagement in the educational reform.

The aim of our research was to identify and assess the perception of students from the Technical University of Cluj-Napoca (Romania) of degree of the community involvement in the academic life.

Material and Method. Technical University of Cluj-Napoca is located in Cluj County, approximately in the middle of Transilvania region. It is the second largest university among six state universities in the city and has approximately 13000 students at nine departments.

The survey was conducted during the first semester of 2008/2009 academic year. A questionnaire with 30 questions was applied to the students from the first to the last (5^{th}) year of the first cycle in higher education.

A stratified random sampling method was applied in order to construct the sample of students included into analysis. Thus, the population of the random sampling was constituted from smallest study formations from all departments and years of study (subgroups), varying from 7 to 21 students, in number of about 1000. Random sampling was applied to these subgroups, and 30 subgroups were selected to be included in the survey. The questionnaire was distributed to the selected groups in order to be fielled freely. Out of 452 enrolled students – 437 attended at the moment of the survey and 403 participated in it.

One of the survey questions (6^{th} question) was *How do you evaluate the involvement degree of the following actors of the academic community in the academic life?: a. Academic Staff; b. Department Staff; c. Teachers; d. Administrative Personnel; f. Students.* The students were asked to evaluate the involvement in the academic life of each class of actors on a None-Small-Medium-High-Highest scale (see Table 1).

Table 1. **Contingency of student's perception regarding the involvement of academic community in academic life**

Community	Involvement					
	None	Small	Medium	High	Highest	Total
Academic Staff	45	125	155	53	11	389
Faculty Staff	29	78	161	115	15	398
Teachers	24	62	142	133	34	395
Administrative Personnel	48	138	150	54	6	396
Students	13	73	147	98	61	392

The degrees of involvement in the academic life evaluated by the students were structured into a contingency table (see Table 1) in order to answer two main issues. First issue concerns the research assumptions. The obvious hypothesis is that it should be an association between the involvement and the community through student's perspective. In the same time the alternative hypothesis may give the answer if the involvement (analyzed as a categorical variable) has the same distribution in all five academic communities proposed for investigation (*academic staff; department staff; teachers; administrative personnel; and students*). Second issue concerns the distribution law of the involvement degree, seen as a continuous variable of an unknown (and to be determined) mean and variance. In order to deal with the second issue, a scale for the involvement categorical variable was assigned: 0 = None; 1 = Small; 2 = Medium; 3 = High; 4 = Highest. Moreover, a more accurate approach is to use an unknown expectation for the highest category.

Results and Discussion. A total number of 403 students completed the questionnaire. The frequency distribution of the answers according to students' department is as follows: 25 from Constructions; 87 from Automation and Computer Science; 95 from Building Services; 35 from Machine Building; 45 from Electronics Telecommunica-tions and Inform; 29 from Electrical Engineering; 14 from Installations in Construc-tions; 53 from Civil Engineering and 20 from Materials Science and Engineering.

Almost 95% answers were valid from the total number of 403 questionnaires. The distribution expressed as absolute frequencies of the degree of involvement in academic life of the studied populations are presented in Table 1. There are no observed biases, largest percent being for department staff (98.8%) and smallest percent being for academic staff (96.5%).

In order to perform the analysis of association between the involvement and the community through student's perspective, the Chi Square test was applied to the data from Table 1. The observed involvement (as categorical variable) of each community sub-population in the students' perception and the community were used in this analysis.

Under hypothesis of homogeneity/independence the expected values ($E_{i,j}$, $1 \le j \le$ for the observed data presented in Table 1 are given by Eq(1) (Fisher, 1925).

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

where $O_{i,j}$ are the entries from Table 1 (i encodes the category of academic community and j encodes the involvement categories).

The result of the Chi Square statistics (X^2) is given in Table 2. This result showed that there is a relationship between the academic role and students' opinions on degree of involvement; the association is assured on every academic role (Table 2, $p\chi^2$ column).

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	5.9	10.2	0.2	14.9	7.9	39.1	$7 \cdot 10^{-6}$
Faculty staff	0.3	3.4	0.5	6.0	4.4	14.7	$5 \cdot 10^{-3}$
Teachers	1.9	11.7	0.6	19.6	2.9	36.7	$2 \cdot 10^{-7}$
Administrative personnel	8.0	18.7	0.0	15.1	14.9	56.8	10^{-11}
Students	11.0	5.0	0.1	0.7	50.5	67.2	$9 \cdot 10^{-14}$
Σ	27.2	49.1	1.4	56.2	80.6	214.5	$9 \cdot 10^{-37}$

$P_\chi{}^2(\Sigma X^2, df, 2)$: the probability from Chi Square distribution to observe a departure from agreement larger than observed one (ΣX^2)
df = 4 for every role (Σ) and df = 16 for entire community (ΣΣ)

A comparison between academic communities regarding the perception of their involvement degree in the views of students' perception was considered suitable and was conducted (Fisher, 1925).

The assumption of binomial distribution of perception should be verified in order to compare the perceptions.

The true proportions in the population was obtained using the uniform category values (0 = None; 1 = Small; 2 = Medium; 3 = High; 4 = Highest) and a binomial approximation of the distribution (see Table 3).

Table 3. **Proportions for perception of academic community involvement**

Involvement	p (N = 4)	X^2	$P_\chi{}^2(X^2, 3)$
Academic staff	0.41003	4.53	21%
Faculty staff	0.50565	12.3	6‰
Teachers	0.55759	9.52	2%
Administrative personnel	0.39394	3.81	28%
Students	0.57717	14.5	2‰

p: True proportion in population; $P_\chi{}^2(\Sigma X^2, df, 2)$: the probability from Chi Square distribution to observe a departure from agreement larger than observed one

The results presented in Table 3 revealed that by using a uniform scale for category values we get an error, because it is hard to reject binomial or normal assumption for the students' perceptions. Thus, a different approach is necessary to be conducted.

The natural way is to assume that the last category (Highest) may have different perception (and thus different category value), which should be assigned with the expectation of involvement. Moreover, this expectation is supposed to be different from one population to another. Therefore, the mean and the expectation under assumption that the populations of involvement are normaly distributed were subject to the analysis.

The Jarque-Bera's test (Jarque and Bera, 1981) was used as an option under normality assumption to find the best values for the means (μ_i, $i = 0$ – academic staff, i = 1 – department staff, $i = 2$ – teachers, $i = 3$ – administrative personnel, and $i = 4$ – students).

Under the assumption that the categories have the values 0 = None; 1 = Small; 2 = Medium; 3 = High; E_i = Highest the formulas for population skewness (Sk_i) and kurtosis (Ku_i) became as were presented in Eq(2) and Eq(3) (where n_i = number of observations in each sample).

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

$$Ku_t = \frac{(n_t + 1)n_t(n_t - 1)}{(n_t - 2)(n_t - 3)}\left(\frac{O_{t,4}(E_t - \mu_t)^4 + \sum_{j=0}^{3} O_{t,j}(j - \mu_t)^4}{\left(O_{t,4}(E_t - \mu_t)^2 + \sum_{j=0}^{3} O_{t,j}(j - \mu_t)^2\right)^2} - \frac{3(n_t - 1)}{n_t(n_t + 1)}\right) \tag{3}$$

The formula of Jarque-Bera's statistics for the populations is given in Eq(4).

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

and it depends on E_i (populations expectances) and μ_i (populations mean).

It is well known that JB statistic had a Chi Square distribution with two degrees of freedom. In order to obtain the values for E_i and μ_i the normality assumption in which both Sk_i and Ku_i converges to 0 was used. Therefore, the JB_i should be minimized:

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

The Eq(5) can be solved analytically or numerically by using a math program. We solved it numerically and the following values were obtained:

$$JB_0 = \min. \quad \Rightarrow \quad JB_0 = 1.5 \cdot 10^{-3};\ \mu_0 = 1.75;\ E_0 = 4.32; \tag{6}$$

$$JB_1 = \min. \quad \Rightarrow \quad JB_1 = 4.7 \cdot 10^{-4};\ \mu_1 = 2.02;\ E_1 = 4.44; \tag{7}$$

$$JB_2 = \min. \quad \Rightarrow \quad JB_2 = 5.8 \cdot 10^{-3};\ \mu_2 = 2.30;\ E_2 = 4.54; \tag{8}$$

$$JB_3 = \min. \quad \Rightarrow \quad JB_3 = 3.1 \cdot 10^{-3};\ \mu_3 = 1.67;\ E_3 = 4.48; \tag{9}$$

$$JB_4 = \min. \quad \Rightarrow \quad JB_4 = 5.593;\ \mu_4 = 2.48;\ E_4 = 4.45. \tag{10}$$

An immediate remark comes from equations (6–10): the Jarqe-Bera's statistics for the perception of the student's involvement is significantly biased than the others (from Chi Square distribution we may find that only about 6% of observations can be worst than that). This remark can be assumed to be true since measuring by them-

selves is a source of bias. The second remark is that all other JB's statistic are very good, the models (6)–(9) being improvements of the models presented in Table 3 (for equations (6)–(9) the highest probability for being in error is for Eq(8) and it is smaller than 3‰).

According to the results (Eq(6)–(10)) the greatest involvement expectation of students is for teachers (E_2 = 4.54) and the lowest expectation is for academic staff (E_2 = 4.32).

The obtained values of means and expectation were used in order to perform a mean comparison test. The Student t test (Student, 1908), modified for different variances and sample sizes (Welch, 1947) was applied (see eq(11), where s_i should be expressed as distance from known means (μ_i) as in Eq(12)).

$$t_{i,j} = \frac{\mu_i - \mu_j}{\sqrt{\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}}},\ df_{i,j} = \frac{\left(\frac{s_i^2}{n_i} + \frac{s_j^2}{n_j}\right)^2}{\left(\frac{s_i^2}{n_i}\right)^2 \Big/ (n_i - 1) + \left(\frac{s_j^2}{n_j}\right)^2 \Big/ (n_j - 1)}, \quad (11)$$

$$s_i^2 = O_{i,4}(E_i - \mu_i)^2 + \sum_{j=0}^{3} O_{i,j}(j - \mu_i)^2. \quad (12)$$

Table 4 cumulates the results for means (μ_i), expectances (E_i) and variances (s_i^2).

Table 4. **Expectances, means, and variances for involvement of different populations in academic life through student's perspective**

Expected	Expectance	Mean	Variance
Academic staff	4.32	1.75	0.84
Faculty staff	4.44	2.02	0.86
Teachers	4.54	2.30	1.07
Administrative personnel	4.48	1.67	0.74
Students	4.45	2.48	1.27

Table 5 contains the probabilities with which pairs of communities had no different population mean.

Table 5. **Probabilities from Student t distribution for same mean involvement in academic life through students' perspective**

pt	Aca	Dpt	Cdi	Adm	Std
Aca	**100%**	4.6E-05	1.2E-14	**21%**	7.1E-22
Dpt	4.6E-05	**100%**	6.7E-05	5.0E-08	6.8E-10
Cdi	1.2E-14	6.7E-05	**100%**	1.4E-19	2%
Adm	**21%**	5.0E-08	1.4E-19	**100%**	1.8E-27
Std	7.1E-22	6.8E-10	2%	1.8E-27	**100%**

Aca: Academic staff; Dpt: Department staff; Std: Students; Cdi: Teachers; Adm: Administrative personnel

Table 5 showed that with a 5% risk of error we cannot reject the hypothesis that the mean of involvement in academic life for academic staff is the same with the mean of involvement in academic life for administrative personnel (the probability of

observing better agreement is 79%). With a 1% risk of error we cannot reject the hypothesis that the mean of involvement in academic life for teachers is the same with the mean of involvement in academic life for students (the probability of observing better agreement is 79%) through students' perception.

Using the values from Table 4, the density probability functions of students' perception of involvement for the different academic communities was graphically presented in Figure 1.

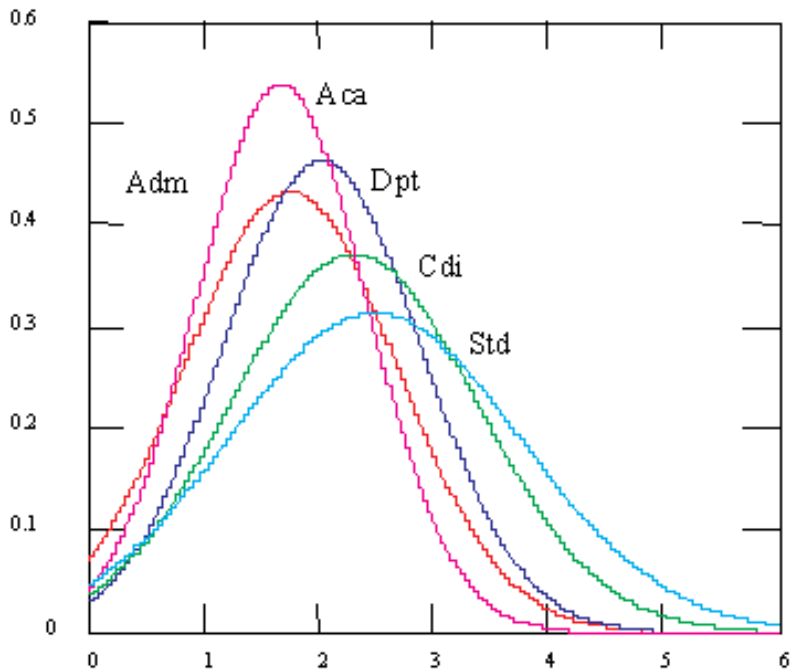

Figure 1. **Density probability functions (PDFs) for students' perception of academic life involvement for different academic communities** (Aca: Academic staff, Dpt: Department staff, Adm: Administrative personnel, Cdi: Teachers, Std: Students)

Conclusions. The results obtained in our study revealed that students have different expectations for involvement in academic life for different academic communities. The greatest expectation is from teachers (expectance of 4.54), followed by administrative personnel (expectance of 4.48), the academic communities with which are supposed to be in direct contact more often then with the others. The lowest expectation comes from academic staff (expectance of 4.32).

By taking variance as a measure of diversity, the less flexible about the involvement in academic life are seen the administrative personnel (variance of 0.74) followed by academic and department staffs (variance of 0.86 and 0.84 respectively), and themselves are seen more flexible (variance of 1.27).

By taking the mean as measure for degree of involvement, the lowest involvement is seen coming from administrative personnel (mean of 1.67), hard to differen-

tiate from the involvement coming from academic staff (mean of 1.75, 21% overlapping) and the highest involvement is seen coming from teachers (of 2.30) and of course by themselves (of 2.48).

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Стаття надійшла до редакції 7.07.2009.