

A STATISTICAL SURVEY UPON THE EVOLUTION OF THE STUDENTS' SATISFACTION REGARDING THE EDUCATIONAL PROCESS

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ABSTRACT: This paper is based on the specifications of the Romanian Agency for Quality Insurance in Higher Education (ARACIS) regarding the assessment of the B.Sc. programs. Some of our prior works are also presented in order to substantiate our solution, focusing on the automation of the statistical calculus.

The paper presents an expert system implemented at the “Tibiscus” University of Timișoara, Romania, used for at least five years to analyze the quality assessment of the educational process, compulsory made by the students at our university using an online web-based application. The results of the analysis and of the statistical processing are used on departments, assuring a transparent policy of the educational high education evaluation. Our application allows the evaluation, the interpretation, the study of the evolution and the history of the results of evaluation, using statistical indicators as the average, the mean squared deviations, the class values, the correlations and others. A widely implemented version of our solution permits to have the same evaluation system in all universities and, by consequence, a unitary insight to the higher education level.

KEYWORDS: quality assessment, high education, statistical processing, means, deviation, correlations.

1. INTRODUCTION

The periodical assessment of the students' satisfaction regarding the educational process we are presenting is based on the stipulations of the ARACIS previously presented in [***06, K+07, KLA12], implemented and updated based on some recent researches as [Fur12, PPV10, P+10, Sko10]. Our university implemented a compulsory method of students' evaluation, based on two separate questionnaires implemented as web applications:

- one for the evaluation of the teaching staff (more results were presented in [CK07, K+10]);
- one for the evaluation of the educational process (more results were presented in [KLA12]).

Both results are processed by the Department of Evaluation and Quality Assurance (D-Q) then discussed on departments and university, in order to adopt the best solutions to improve the results of the educational process. Also, these results are openly

presented on the university web site, accessible to the public (students, parents, candidates, stakeholders, state authorities [AGP12]).

The web applications we proposed for the evaluation allows:

- for students: to evaluate the educational process;
- for the D-Q: to validate the evaluations and to interpret the results of the statistical processing of the results, using different criteria;
- for the heads of the department / university: to obtain a feed-back from the students and to apply adequate measures to increase the quality of the educational process.

We're concentrating now on the assessment of the educational process, which is based on a questionnaire containing 15 questions:

- Q.1: Student-centered learning methods
- Q.2: Practical application of the knowledge
- Q.3: Possibility of course selection
- Q.4: Audio-video and computers
- Q.5: Student services
- Q.6: Availability of learning resources
- Q.7: Library access
- Q.8: Career guidance to students
- Q.9: Partnerships with other universities
- Q.10: Quality of teaching
- Q.11: Availability of staff
- Q.12: Furniture
- Q.13: Recreational spaces
- Q.14: Educational spaces
- Q.15: Structure of the study program

namely regarding:

- the endowment (4 items – Q.4, Q.12, Q.13, Q.14);
- the contents of study (3 items – Q.2, Q.3, Q.15);
- the learning outcomes (2 items – Q.1, Q.8);
- the accessibility of learning resources (6 items – Q.5, Q.6, Q.7, Q.9, Q.10, Q.11).

We're now presenting the results of the evaluation for the Computer Science Bachelor program (implemented by the Faculty of Computers and Applied Computer Science), between 2011 and 2014 – as seen in Table 1.

Table 1. The answers' aggregate for the 2011/2012 academic year

Q.	1 st year						2 nd year						3 rd year						Totally									
	1	2	3	4	5	Med	St.D.	1	2	3	4	5	Med	St.D.	1	2	3	4	5	Med	St.D.	1	2	3	4	5	Med	St.D.
Q.1	0	0	0	14	6	4,30	0,47	0	0	3	9	13	4,40	0,71	1	0	1	12	11	4,28	0,89	1	0	4	35	30	4,33	0,72
Q.2	0	0	4	9	7	4,15	0,75	0	0	5	12	8	4,12	0,73	1	0	2	11	11	4,24	0,93	1	0	11	32	26	4,17	0,80
Q.3	0	0	2	7	11	4,45	0,69	0	0	0	11	14	4,25	0,51	1	0	1	13	10	4,24	0,88	1	0	3	31	35	4,41	0,71
Q.4	0	0	0	5	15	4,75	0,44	0	0	0	10	15	4,60	0,50	0	0	1	11	12	4,46	0,59	0	0	1	26	42	4,59	0,52
Q.5	0	1	4	5	10	4,20	0,95	0	2	3	11	9	4,08	0,91	0	1	10	9	4	3,67	0,82	0	4	17	25	23	3,97	0,91
Q.6	0	0	2	11	7	4,25	0,64	0	0	2	9	14	4,48	0,65	0	0	0	12	12	4,50	0,51	0	0	4	32	33	4,42	0,60
Q.7	0	0	1	13	5	4,21	0,54	0	2	5	11	7	3,92	0,91	1	0	4	14	6	3,96	0,89	1	2	10	38	18	4,01	0,81
Q.8	0	0	6	10	3	3,84	0,69	0	3	3	6	12	4,13	1,08	1	0	4	13	6	3,96	0,91	1	3	13	29	21	3,99	0,91
Q.9	0	1	8	8	2	3,58	0,77	0	0	10	9	6	3,84	0,80	0	2	8	4	10	3,92	1,06	0	3	26	21	18	3,79	0,89
Q.10	0	1	1	6	12	4,45	0,83	0	0	1	11	13	4,48	0,59	0	1	1	12	11	4,32	0,75	0	2	3	29	36	4,41	0,71
Q.11	0	0	6	5	9	4,15	0,88	0	1	10	9	5	3,72	0,84	0	2	7	7	9	3,92	1,00	0	3	23	21	23	3,91	0,91
Q.12	0	1	2	7	10	4,30	0,86	0	1	5	10	9	4,08	0,86	1	0	0	11	12	4,38	0,88	1	2	7	28	31	4,25	0,86
Q.13	0	3	11	2	3	3,26	0,93	0	7	9	4	5	3,28	1,10	0	11	6	2	5	3,04	1,20	0	21	26	8	13	3,19	1,08
Q.14	0	0	4	5	11	4,35	0,81	0	0	1	12	12	4,44	0,58	0	0	3	7	15	4,48	0,71	0	0	8	24	38	4,43	0,69
Q.15	0	1	3	7	9	4,20	0,89	0	2	2	7	14	4,32	0,95	1	0	1	5	18	4,56	0,91	1	3	6	19	41	4,37	0,92
Med.						4,16	0,36						4,14	0,35						4,13	0,40						4,15	0,38

One-Sample Kolmogorov-Smirnov Test

		VAR00002
N		15
Normal Parameters ^{a,b}	Mean	4,1627
	Std. Deviation	,36394
Most Extreme Differences	Absolute	,286
	Positive	,148
	Negative	-,286
Kolmogorov-Smirnov Z		1,108
Asymp. Sig. (2-tailed)		,171

a. Test distribution is Normal.

b. Calculated from data.

Figure 1. The means distribution for the 1st year

One-Sample Kolmogorov-Smirnov Test

		VAR00003
N		15
Normal Parameters ^{a,b}	Mean	4,1427
	Std. Deviation	,34917
Most Extreme Differences	Absolute	,162
	Positive	,100
	Negative	-,162
Kolmogorov-Smirnov Z		,628
Asymp. Sig. (2-tailed)		,825

a. Test distribution is Normal.

b. Calculated from data.

Figure 2. The means distribution for the 2nd year

A statistical processing of these results shows that all three years means (4,16; 4,14; 4,13) are very close to the totally mean (of all study years, 4,15), that the standard deviations are low (0,36; 0,35;

0,40) and close to the totally deviation (0,38) and all results distribution follows a Normal distribution.

One-Sample Kolmogorov-Smirnov Test

		VAR00004
N		15
Normal Parameters ^{a,b}	Mean	4,1287
	Std. Deviation	,40037
Most Extreme Differences	Absolute	,210
	Positive	,141
	Negative	-,210
Kolmogorov-Smirnov Z		,811
Asymp. Sig. (2-tailed)		,526

a. Test distribution is Normal.

b. Calculated from data.

Figure 3. The means distribution for the 3rd year

Regarding the evolution of the results, the means of the 2011/2012, 2012/2013 and 2013/2014 evaluations are depicted in the figures 4, 5, and 6 respectively.

For the 2011/2012 year, as presented in figure 4, there are no "1" (=insufficient) answers and the "2" (=sufficient) and "3" (=medium) answer are rarely present. The "4" (=good) and "5" (=very good) answers predominate, being approximately equal.

The same results can be observed for the 2012/2013 and the 2013/2014 year.

All the answers follow this pattern, except the Q.13 question where the "2" and "3" answers are preponderant.

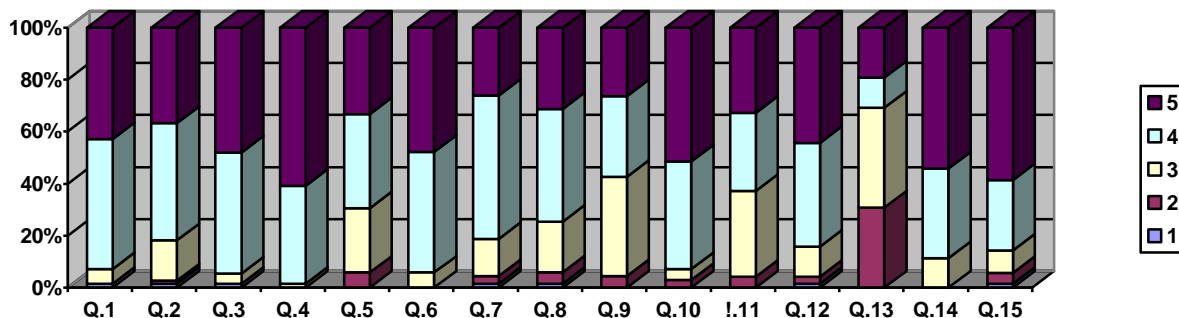


Figure 4. The means distribution for the 2011/2012 year

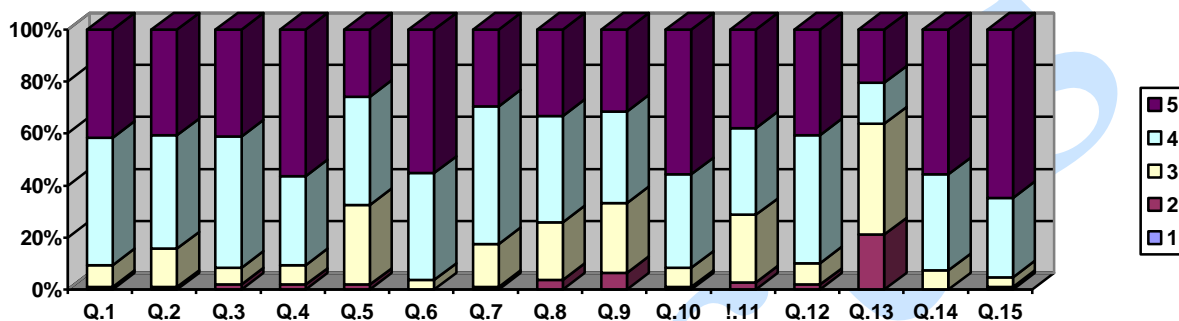


Figure 5. The means distribution for the 2012/2013 year

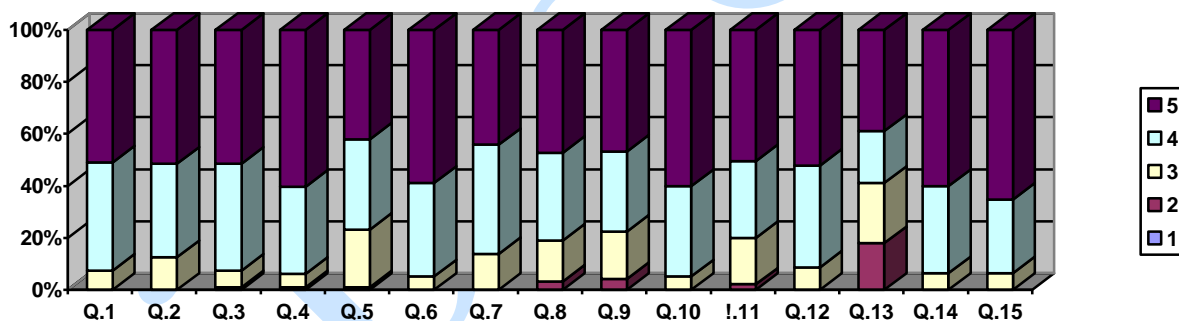


Figure 6. The means distribution for the 2013/2014 year

Table 2. The evolution of the answers between 2011 and 2014

Q.	1 st year 2011/2012								2 nd year 2012/2013								3 rd year 2013/2014							
	1	2	3	4	5	Med	St.D.	1	2	3	4	5	Med	St.D.	1	2	3	4	5	Med	St.D.			
Q.1	0	0	0	14	6	4,30	0,47	0	0	2	9	19	4,57	0,63	0	0	2	8	20	4,60	0,62			
Q.2	0	0	4	9	7	4,15	0,75	0	0	4	13	13	4,30	0,70	0	0	3	10	17	4,47	0,68			
Q.3	0	0	2	7	11	4,45	0,69	0	0	1	15	13	4,41	0,57	0	0	0	13	17	4,57	0,50			
Q.4	0	0	0	5	15	4,75	0,44	0	0	1	10	19	4,60	0,56	0	0	0	10	20	4,67	0,48			
Q.5	0	1	4	5	10	4,20	0,95	0	1	3	15	11	4,20	0,76	0	0	3	11	16	4,43	0,68			
Q.6	0	0	2	11	7	4,25	0,64	0	0	1	7	22	4,70	0,53	0	0	0	9	21	4,70	0,47			
Q.7	0	0	1	13	5	4,21	0,54	0	1	8	13	8	3,93	0,83	0	0	5	10	14	4,31	0,76			
Q.8	0	0	6	10	3	3,84	0,69	0	4	4	7	15	4,10	1,09	0	3	2	7	18	4,33	0,99			
Q.9	0	1	8	8	2	3,58	0,77	0	1	5	15	9	4,07	0,78	0	0	4	11	15	4,37	0,72			
Q.10	0	1	1	6	12	4,45	0,83	0	0	2	10	18	4,53	0,63	0	0	1	10	19	4,60	0,56			
Q.11	0	0	6	5	9	4,15	0,88	0	0	11	10	9	3,93	0,83	0	0	7	9	15	4,26	0,82			
Q.12	0	1	2	7	10	4,30	0,86	0	1	6	14	9	4,03	0,81	0	0	4	11	15	4,37	0,72			
Q.13	0	3	11	2	3	3,26	0,93	0	7	14	4	5	3,23	1,01	0	5	7	6	13	3,87	1,15			
Q.14	0	0	4	5	11	4,35	0,81	0	0	2	11	17	4,50	0,63	0	0	1	11	19	4,58	0,56			
Q.15	0	1	3	7	9	4,20	0,89	0	1	1	6	22	4,63	0,72	0	0	2	7	21	4,63	0,61			

Table 2 presents the evolution of the answers of the same students, according to their promotion from the 1st year (2011/2012) to the 2nd then 3rd year (2013/2014). The totally means are evolving from 4,16 (=very good) to 4,25 respectively 4,45, so we can appreciate this route as a clear improvement of the students' satisfaction.

At the *Q.1: Student-centered learning methods*, the means evolution shows an increase of the "very good" answers (figure 7).

At the *Q.2: Practical application of the knowledge*, the means evolution shows an increase of the "very good" answers (figure 8).

At the *Q.3: Possibility of course selection*, the means evolution shows a sinuous evolution of the "very good" answers (figure 9).

At the *Q.4: Audio-video and computers*, the means evolution shows a sinuous evolution of the "very good" answers (figure 10).

At the *Q.5: Student services*, the means evolution shows a sinuous evolution of the "very good" answers (figure 11).

At the *Q.6: Availability of learning resources*, the means evolution shows an increase of the "very good" answers (figure 12).

At the *Q.7: Library access*, the means evolution shows an increase of the "very good" answers (figure 13).

At the *Q.8: Career guidance to students*, the means evolution shows an increase of the "very good" answers (figure 14).

At the *Q.9: Partnerships with other universities*, the means evolution shows an increase of the "very good" answers (figure 15).

At the *Q.10: Quality of teaching*, the means evolution shows a relative stability of the "very good" answers (figure 16).

At the *Q.11: Availability of staff*, the means evolution shows a sinuous evolution of the "very good" answers (figure 17).

At the *Q.12: Furniture*, the means evolution shows a sinuous evolution of the "very good" answers (figure 18).

At the *Q.13: Recreational spaces*, the means evolution shows an increase of the "very good" answers (figure 19).

At the *Q.14: Educational spaces*, the means evolution shows a relative stability of the "very good" answers (figure 20).

At the *Q.15: Structure of the study program*, the means evolution shows a sinuous evolution of the "very good" answers (figure 21).

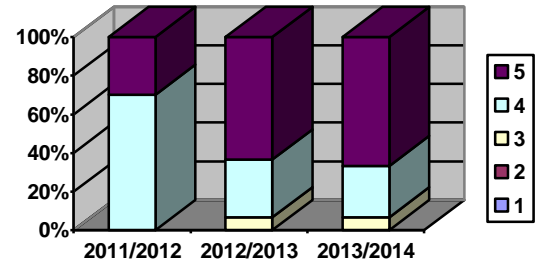


Figure 7. Evolution of the Q.1 answers during a cycle of study

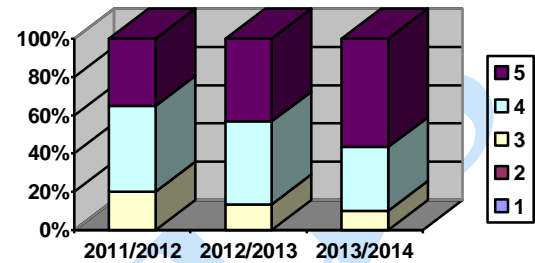


Figure 8. Evolution of the Q.2 answers during a cycle of study

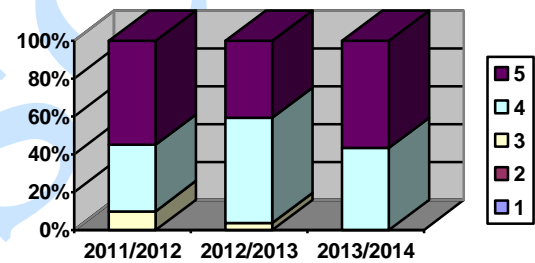


Figure 9. Evolution of the Q.3 answers during a cycle of study

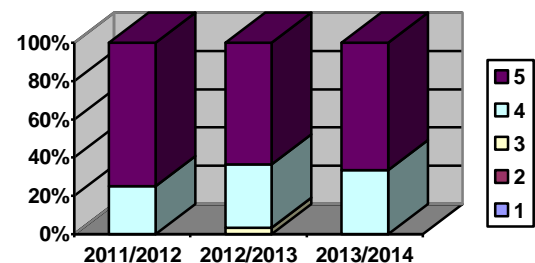


Figure 10. Evolution of the Q.4 answers during a cycle of study

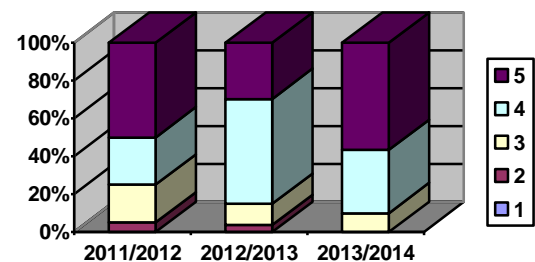


Figure 11. Evolution of the Q.5 answers during a cycle of study

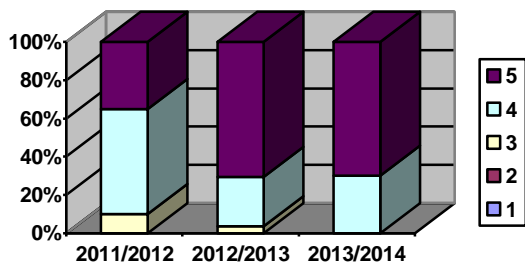


Figure 12. Evolution of the Q.6 answers during a cycle of study

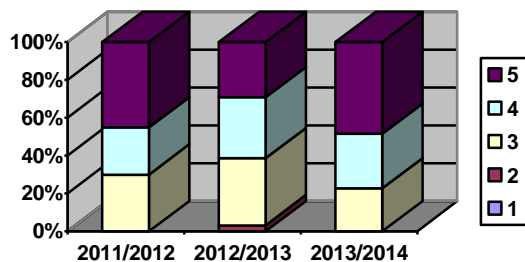


Figure 17. Evolution of the Q.11 answers during a cycle of study

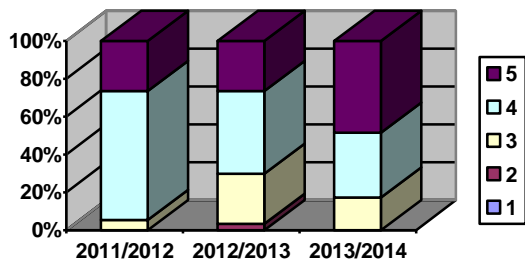


Figure 13. Evolution of the Q.7 answers during a cycle of study

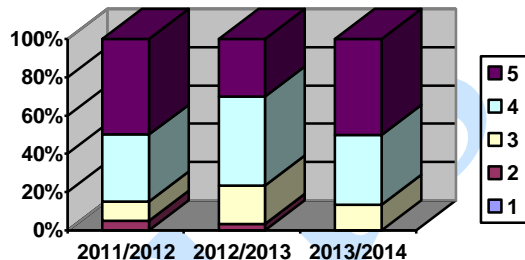


Figure 18. Evolution of the Q.12 answers during a cycle of study

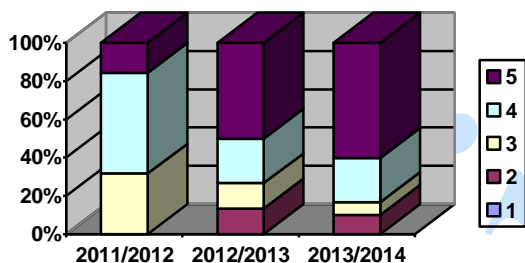


Figure 14. Evolution of the Q.8 answers during a cycle of study

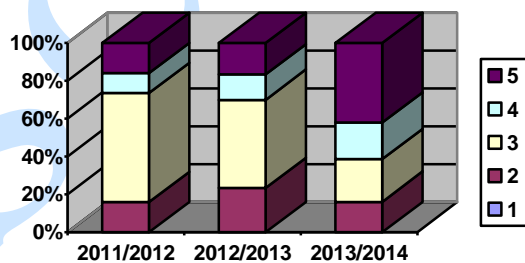


Figure 19. Evolution of the Q.13 answers during a cycle of study

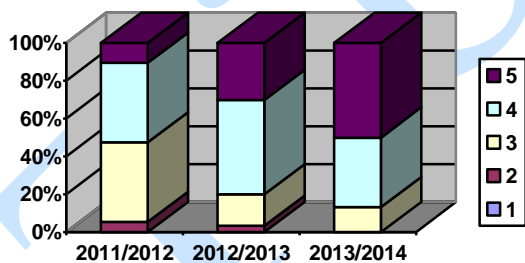


Figure 15. Evolution of the Q.9 answers during a cycle of study

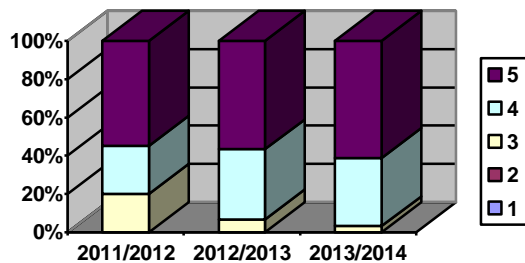


Figure 20. Evolution of the Q.14 answers during a cycle of study

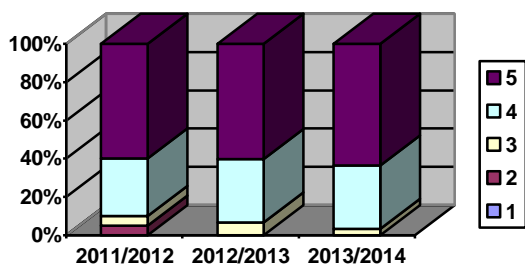


Figure 16. Evolution of the Q.10 answers during a cycle of study

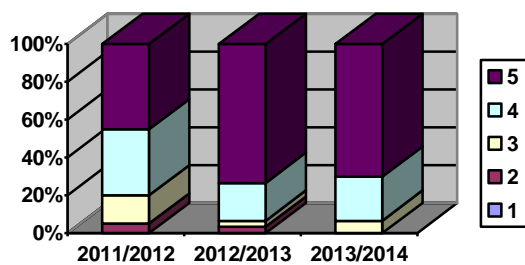


Figure 21. Evolution of the Q.15 answers during a cycle of study

The answers are sometimes very close to the mean value of the whole period (result: the standard deviation is minim) as presented in the table 3, and some answers are surpassing the mean (table 4).

As presented in table 4, the *Q.3: Possibility of course selection* answers (with 9 surpassing) shows that students are content about the possibility to select the optional courses according to their personal interest.

As seen in table 4, at the *Q.4: Audio-video and computers* all answers are surpassing the mean so we can conclude that students appreciate the efforts of the university for the continuous development of the teaching means.

Also, at the *Q.6: Availability of learning resources*, the results indicates that the educational resources available in the university library or in e-format are sufficient for a good education.

The 9 surpassing results at the *Q.14: Educational spaces* demonstrate a good disposal of the classrooms and laboratories.

Finally, the *Q.15: Structure of the study program* answers indicates a good understanding and appreciation upon the curricula and upon the disciplines' content.

Opposite, the lack of surpassing of the *Q.13: Recreational spaces* answers are a sign for the university management to implement a plan to build (maybe rent) some spaces for the extracurricular time of the students, which is also a time for the fair future development of the students.

Intriguing for us is the result of the *Q.9: Partnerships with other universities*, because the university developed a lot of international Erasmus programs with outside institutions (from France, Germany, Spain etc.), maybe this result may be interpreted as a lack of communications between the local promoters and students.

Table 3. Answers around the mean

Q	2011/2012			2012/2013			2013/2014			Sum
	I	II	III	I	II	III	I	II	III	
Q.1										
Q.2										
Q.3										
Q.4										
Q.5			X	X		X	X			4
Q.6										
Q.7		X	X		X					3
Q.8	X		X	X						3
Q.9	X	X	X			X	X			5
Q.10										
Q.11		X	X		X					3
Q.12										
Q.13	X	X	X	X	X	X	X	X	X	9
Q.14										
Q.15										

Table 4. Answers surpassing the mean

Q	2011/2012			2012/2013			2013/2014			Sum
	I	II	III	I	II	III	I	II	III	
Q.1	X	X	X		X	X	X		X	7
Q.2			X	X	X	X	X	X	X	7
Q.3	X	X	X	X	X	X	X	X	X	9
Q.4	X	X	X	X	X	X	X	X	X	9
Q.5	X									1
Q.6	X	X	X	X	X	X	X	X	X	9
Q.7	X					X	X			3
Q.8							X			1
Q.9										
Q.10	X	X	X	X	X	X		X	X	8
Q.11				X				X		2
Q.12	X		X	X		X	X	X		6
Q.13										
Q.14	X	X	X	X	X	X	X	X	X	9
Q.15	X	X	X	X	X	X	X	X	X	9

CONCLUSIONS

Our paper presented a survey upon the evolution of the students' satisfaction upon the educational process, using a computer aided management system we developed at the "Tibiscu" University of Timișoara.

As presented above, we can conclude (from table 1) that students expectations are fulfilled: more than $\frac{3}{4}$ of the students are satisfied/very satisfied on the offered conditions:

- 1st year 2011/2012: 78% of the answers are "good" and "very good";
- 2nd year 2011/2012: 79% of the answers are "good" and "very good";
- 3rd year 2011/2012: 80% of the answers are "good" and "very good".

Also, the students' expectations improve continuously during their academic route (from table 2):

- 1st year 2011/2012: 78% of the answers are "good" and "very good";
- 2nd year 2012/2013: 82% of the answers are "good" and "very good";
- 3rd year 2013/2014: 89% of the answers are "good" and "very good".

Finally, as seen, the differences between the studying years are low; we can conclude that the results are harmonious and reflect a median trend of the students' opinion.

Thus, as a final conclusion, a continuous and constant improvement of the students' satisfaction regarding the educational process is obvious observable, demonstrating a proper implementation of the measures for a better curriculum, for better prepared teachers and for modern learning conditions, part of the Quality Assurance Strategy of our university.

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