

ANALYZING AND IMPROVING TEACHING METHODS IN HIGHER EDUCATION: CASE STUDY ON ROMANIA

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Abstract:

The goal of the paper is to investigate current methods employed within the teaching-learning process in technical higher education in Romania. The methodology consists in conducting a survey by applying a questionnaire to students from technical faculties, data analysis and collaborating with the private sector to assess the skills of the graduates. Results provide insights on improvement areas for teaching methods and enable competitiveness for the public sector by providing well-trained graduates through a quality-focused teaching-learning process.

Keywords: teaching-learning process, case study, technical higher education, competitiveness, collaboration

1. INTRODUCTION

Education is one of the main pillars in most countries, it is important for it to be developed and innovated in a continuous flow. Quality of life is a key parameter to consider when society and its members interact (Cioca et al., 2013). Education can become crucial in evaluating social progress and quality of life. Therefore, assessing the needs and desires of young people in terms of teaching-learning becomes mandatory for the development of a competitive environment (Ahrweiler et al., 2011; Kurmanov et al., 2013).

The higher education system in Romania has experienced a significant transformation over time, and it is appropriate to analyse the situation of higher education in technical universities. Education is an important pillar in the development of each country because it (Date et al., 2011; Kurmanov et al. 2015):

- Contributes to national development;
- Shapes new skills;
- Develops skills that help form the individual in a profession;
- Develops new opportunities for cooperation and collaboration;
- Balances social environment from the social perspective;
- Contributes to the sustainability of education through other elements as well

The present paper focuses on:

- Higher Technical Education in Timisoara / Politehnica University of Timisoara;
- Students of Faculty of Management in Production and Transportation (FMPT);
- FMPT activates in the fields Engineering and Management;
- Using the survey questionnaire. The questionnaire was applied online to identify current characteristics of higher education in the vision of students.
- Analysis of public data found on university websites;
- Statistics of accessing the site (www.mpt.upt.ro) by students involved in the teaching-learning process

2. THE TECHNICAL HIGHER EDUCATION IN ROMANIA: SWOT ANALYSIS

Legal framework: The establishment of higher education is possible based on related laws published nationwide, according to the procedures for recognition and accreditation of diplomas (Law 88/1993 amended by Law 144 / 1999). The overview of the Romanian higher education quality, as derived from the analysis of public data of students and employers, shows a relatively high level of quality. In terms of trends, however, if the perceptions of teachers and employers remained stable, the students recorded an impairment over the past few years.

Further work focuses on data obtained from the questionnaire applied to FMPT students to identify the characteristics of the teaching-learning process and other technical elements that define higher education. To this end, the authors performed a SWOT analysis to define the framework in which students operate. Analysing the MPT faculty environment using SWOT (Strengths, Weaknesses, Opportunities and Threats) outlined the following elements from both internal and external environment (see Table 1).

Table 1: SWOT analysis of the FMPT

Strengths	Weaknesses
1. Competence in research and in the teaching process of the teachers is demonstrated by papers published in journals, international conferences and results of students' degree of engagement 2. Collaborations with representative firms / companies from the area 3. Various research collaborations 4. Experience in defining new courses with a high degree of readiness	1. Weak level of scholarship funding compared to students' expectations. 2. Insufficient integration into the European research area; however an improvement is to be noted, by the growing number of international publications in some research groups 3. The employability of students 4. The quality of high school graduates 5. The skills outlined during the previous training cycle

5. National and international reputation 6. Satisfaction of the students 7. Infrastructure used in the teaching-learning process 8. Multiple grants for infrastructure and research	6. Availability of students to be actively involved in research 7. The attention to general topics forming their core competencies for various fields 8. The involvement of students in internships / organised training
Opportunities	Threats
1. The high demand for well-trained specialists in business management 2. Increasing business needs for graduates with advanced training levels, while the duration of the training cycle basis was reduced by one year 3. Young doctors that can be actively involved in the teaching-learning processes 4. Collaborations between Romanian students and students from abroad 5. Research visits to companies from abroad	1. High percentage of students that are full time employees and, therefore, have reduced time availability for a program of individual studies and research 2. Low interest in research from many students who are heading primary towards a career in the industry 3. Other competing universities that attract students from the country area of FMPT 4. Companies that develop their own study academies

Following this analysis it can be concluded that, firstly, to generate high consumption levels of education in the country, it is a must to have educational products and services of high quality, including teachers, technology and educational processes that relate the specifics of the business environment in our country. Also, in order to develop a teaching-learning process suitable for the business environment we need the involvement of companies as well. And finally, generating a quality education is directly correlated with legislation that supports public higher education with national financing.

2.1. Methodology

For this research, we used the questionnaire applied to 400 students of technical university education of the university from the fundamental domain *Engineering and Management*. Also we used online environment parameters, own website, and existing nationwide public data. The questionnaire as a basic research tool was chosen following evaluation of different methods, and as online application we used Google Form having for the diversity of features also the unlimited potential offered by this platform (Google Form Platform).

2.2. Analysis of obtained data

By applying the questionnaire to the 400 respondents the features of higher technical education in Romania can be shaped. Respondents can be characterized by: young people between 18 - 22 years, with Romanian citizenship that are undergraduate students at the FMPT. FMPT is one of 10 faculties of the Polytechnic University of Timisoara, the Fundamental domain is Engineering Sciences, and the Graduation domain is Engineering and Management, with the following Science Branches: Mechanical Engineering, Mechatronics, Industrial Engineering, and Management.

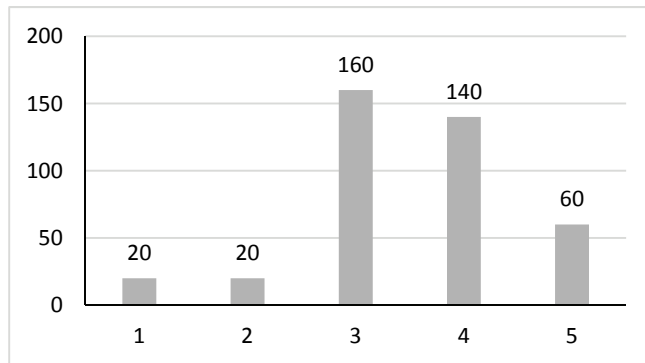
The applied questionnaire includes evaluation to three main areas:

1. engineering teaching-learning methods
2. IT environments used in learning
3. identification of learning style and personal information

Taking the first category for analysis, the engineering teaching-learning methods, it can be concluded that 97.4 % of students participated in each activity of the curriculum in each discipline at a rate of at least 50 %. This leads to the shaping and development of skills and competencies that help their employability.

The respondents estimate that the technical support contributes in an average proportion to their training as an engineer. Even if the percentage is heading for the highest grade, most students prefer the practical approach of the disciplines (see Picture 1)

Picture 1: The contribution of theoretical support in training engineers (1-very little, 5-very much)



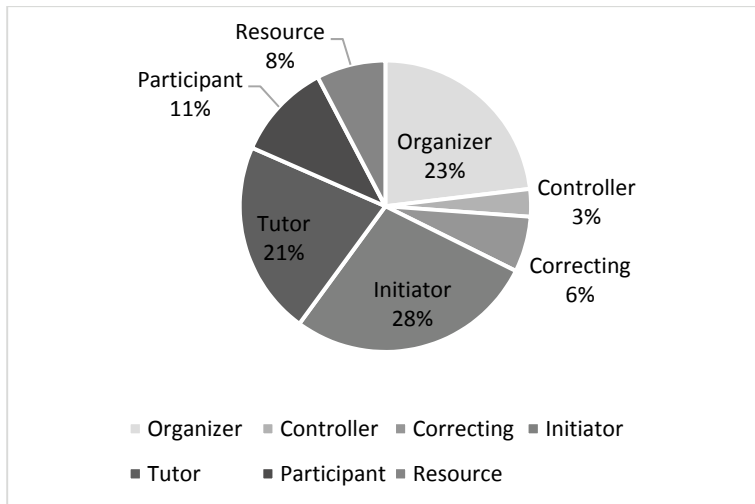
From the endowments perspective of classrooms and seminars, 95% believe that the university has the necessary infrastructure for student training as an engineer, professional in the field of competence. From the perspective of course support 46.2 % prefer structuring the course material by dictation (see Table 2). The respondents prefer for the seminars / labs, examples and visits to the companies in proportion of 30.8 %. They are followed at a distance by case studies, 7.7 %. The respondents prefer the course material in electronic format, 53.8%, and appreciate the interactive method of teaching in working groups (see Table 3).

Table 2: The teaching-learning process

Type of questions	Type of answers	Percent
Course format	Through presentations on the projector	15.4
	Through presentations and videos	33.3
	Virtual (Skype)	5.1
	By dictation (punctual and structured)	46.2
Seminar typology	Examples	30.8
	Aplications	12.8
	Case Studies	7.7
	Visits to companies	30.8
	Other	17.9
Support format	In electronic format	53.8
	Seminar guide / textbook	17.9
	Only use notes, do not need additional material	28.2
Interactive teaching-learning methods	Methods for problem solving by stimulating creativity	30.8
	Methods of teaching and interactive learning in group	38.5
	Research methods in group	15.4
	I prefer individual learning	15.4

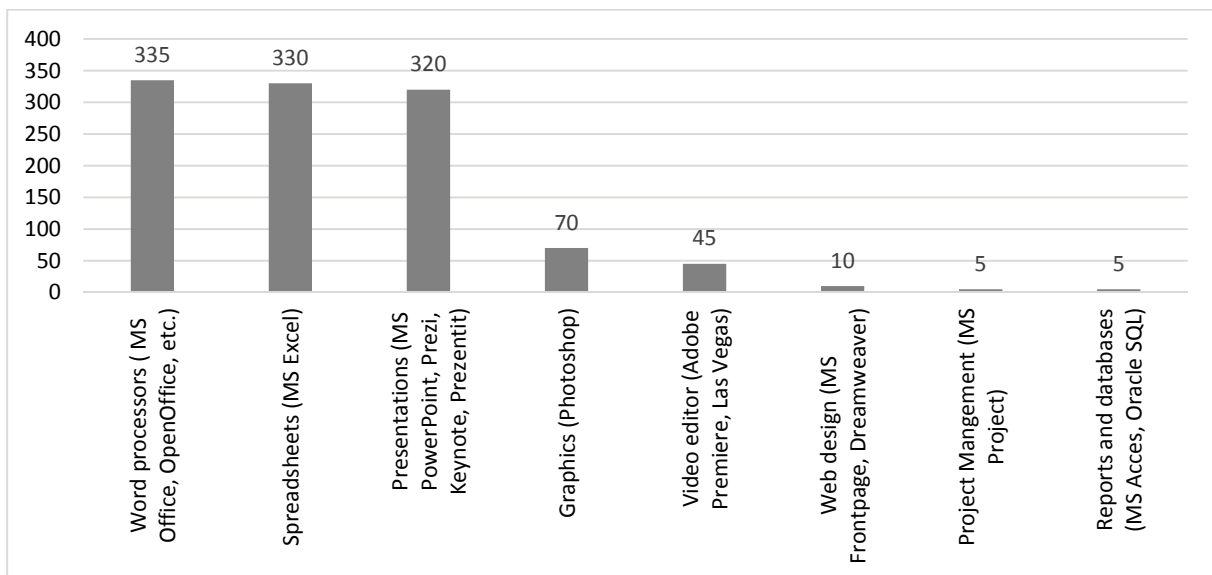
The questionnaire by its structure also follows the recording of teacher characteristics from students' perspective. The teacher is considered to be in a percentage of 28 %, an initiator of teaching. The assessments were grouped by the entire scale of the question (see Table 2). The question type used is multiple choice because the purpose is to identify all the combinations of roles.

Picture 2: Teacher typology



Going through the responses obtained in the second part of the questionnaire from the perspective of the structure, namely the IT environments used by students in the teaching-learning process, it is seen as IT environments used in technical education in the field of Engineering Sciences, the ones shown in Picture 3. The most popular IT environment used is the word processing. It is noticed that students use extensively the presentations and tabular calculations supporting their projects or other activities. The question type used is multiple choice because the purpose is to identify all IT environments used by students.

Picture 3: IT Environments used by students



Social networks are used on a daily basis by 95 % of the students surveyed. Of these, 90 % use organized email groups at the start of the academic year. Most students choose technical education in Timisoara, UPT, based on the following reasons: the reputation of the university (51.3 %), training as an engineer (43.6 %), friends and family as stimulus (33.3 %), Internet searches (15.4 %).

Analysing the second category of questions about personal information, it can be stated that the visual learning style is mostly encountered, sanguine temperament registers a percentage of 48.7 % and the engineering degree motivates in graduating this education. The data collated in this direction can be found in Picture 4 and Table 3.

Picture 4: The temperament (a), Learning Style (b)

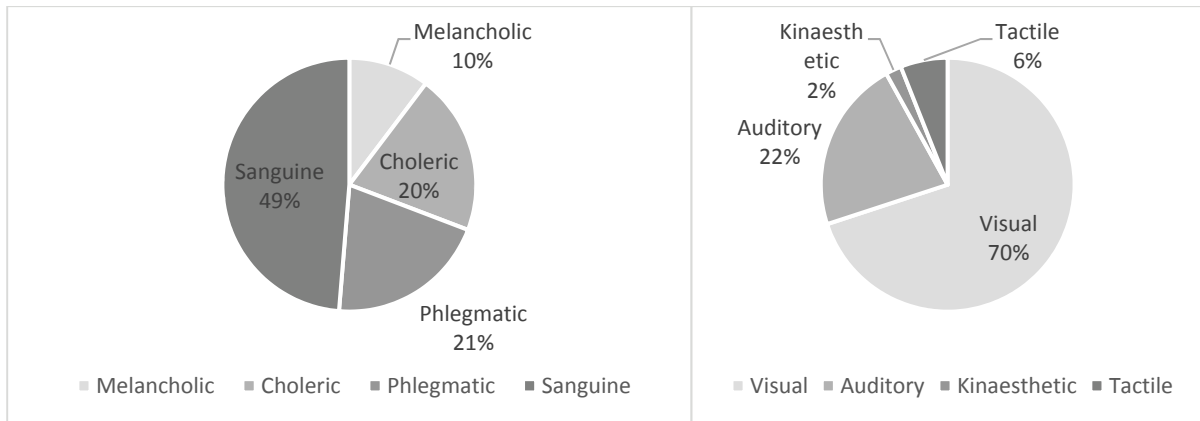


Table 3: The motivation in student activity

Category	Type of data	Percent
Motivation in student activity	Obtaining the engineer title	39.5%
	Belonging to a reputable university	2.6%
	Acquired competences	26.3%
	Development environment	28.9%
	Facilities offered (home, sports facilities, scholarships)	2.6%

In conclusion, the respondents appreciate interactive learning and teaching methods as well as social communication methods, but from the perspective of the course material exposure they prefer structuring by exposure / dictation.

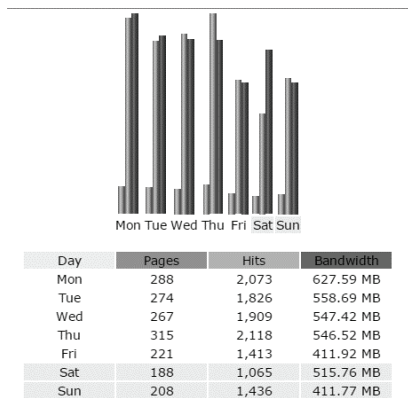
2.3. Faculty site analysis / online information environment analysis

In this study we considered appropriate to introduce the statistics of the online platform used by the surveyed students. The respondents said they use the site, they know it very well and they use it each time when it is needed. The evaluation of public data quantify and outlines the strategy exposed in Section 3-a. For the holiday period, the students do not access the site, and they are not concerned about learning. Starting with the teaching period there is an increase of visits (see Picture 5) and in the distribution of days of the week it is seen that the beginning of the week brings more visitors (Picture 6). Favourite hours are directed toward evening hours (see Picture 7).

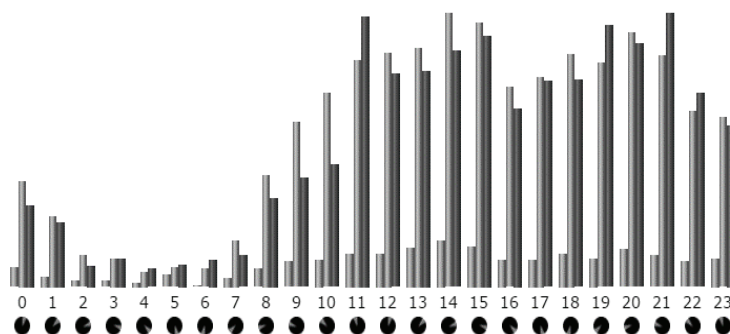
Picture 5: Statistics (www.mpt.upt.ro)

Day	Number of visits	Pages	Hits	Bandwidth
01 Jan 2016	0	0	0	0
02 Jan 2016	0	0	0	0
03 Jan 2016	0	0	0	0
04 Jan 2016	0	0	0	0
05 Jan 2016	0	0	0	0
06 Jan 2016	47	143	933	237.67 MB
07 Jan 2016	97	369	2,068	374.55 MB
08 Jan 2016	75	339	1,664	435.40 MB
09 Jan 2016	74	231	1,361	320.73 MB
10 Jan 2016	76	283	1,702	542.54 MB
11 Jan 2016	121	362	2,665	722.34 MB
12 Jan 2016	117	378	2,506	647.45 MB
13 Jan 2016	109	369	2,526	575.11 MB
14 Jan 2016	110	265	1,792	523.61 MB

Picture 6: Days of week



Picture 7: Hours of days



Presence in the online environment is already a common component being integrated into the teaching-learning process and accepted by all respondents as adjoining part of the classic face to face process.

3. DEVELOPMENT STRATEGY OF HIGHER EDUCATION

Technical higher education competitiveness depends on factors that help its development and of course on the perturbations in the environment e.g. competition (Cioca et al., 2013). The strategy that should be adopted by every faculty / university should be adapted to the characteristics of the domain in which they exist as an entity. Higher technical education development strategy is based on certain factors which include:

- Correct and realistic identification of target audience;
- Basic problems encountered from high school;
- Developing the skills of the young graduate;
- Use online environment for teaching and learning;
- Online communication for the barriers encountered during the preparation and exam session;
- Online / labs consulting sessions;
- Developing an optimal learning environment (dormitories, reading rooms, et al.);
- Other information to be included in the base process.

After analysing the data from the previous chapter, we can outline that to form quality engineers education should be oriented towards the development of appropriate competencies with business, delivered through classroom presentations, and the online environment to only be used complementary.

4. CONCLUSIONS AND FUTURE RESEARCH

Some elements structurally presented in this paper are important and should be highlighted as a key role in determining organizational behaviours and strategies that students have and adapting teaching techniques depending on the competitive environment. The students are the central product of technical higher education and that will contribute to the development of business environment (Draghici et al., 2015). The business environment offers various opportunities and is open to

collaboration with technical universities to form engineers with skills and abilities required for employment.

REFERENCE LIST

1. Ahrweiler, P., Pyka, A., & Gilbert, N. (2011). A new model for University-Industry Links in Knowledge-Based Economies. *Journal of Product Innovation management*, 28. 218-235.
2. Cioca, M., Ghete, A. I., Cioca, L. I. & Gifu, D. (2013). Machine Learning and Creative Methods Used to Classify Customers in a CRM Systems, *Innovative Manufacturing Engineering, Applied Mechanics and Materials*, 371, 769-773.
3. Cioca, L.I. & Ivascu, L. (2013). Systemic Approach for Modeling the Attitude towards Risk and Risk Assessment", *International Conference on Social Science and Society (ICSSS), Advances in Education Research*, 32, Korea, Jeju Island ,74-80.
4. Datar, S. M., Garvin, D. A., & Cullen, P. G. (2011). Rethinking the MBA: business education at a crossroads. *Journal of Management Development*, 30(5), 451-462.
5. Draghici, A., Baban, C.F., Ivascu, L.V. & Sarca, I. (2015). Key Success Factors for University - Industry Collaboration in Open Innovation, 8th annual International Conference of Education, Research and Innovation (ICERI 2015), Seville, Spania.
6. Faculty of Management in Production and Transportation, www.mpt.upt.ro
7. Kurmanov, N. A., Zhumanova, B. K., & Kirichok, O. V. (2013). Business-Education in Kazakhstan: Opportunities and Development Strategy. *World Applied Sciences Journal*, 21 (10), 1495-1501.
8. Kurmanov, N., & Aliyev, U. (2015). Higher Education in the Republic of Kazakhstan: Problems And Improvement Methods, *Cbu International Conference on Innovation, Technology Transfer And Education*, 141-149.
9. Google form Platform, <https://www.google.com/forms/about/>
10. Politehnica University of Timisoara, www.upt.ro