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ASPECTS CONCERNING GRAPHICAL EDUCATION QUALITY MANAGEMENT IN THE ENGINEERING TRAINING PROCESS

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ABSTRACT
The new directions in concordance with Bologna process impose a modern approach in the engineers' education, too. The technical graphics is one of fundamental science, which offers the abilities for understanding the technical ideas as a whole to students from technical profile. The paper presents aspects concerning engineers' graphics education in the increased quality and adapted to actual informatics society conditions.
Keywords: Education, Engineering graphics, Quality Management activities.

1. INTRODUCTION

Nowadays, a different attention for legitimacy to quality assurance in High Education is manifested in all worlds. For this reason, it is unfurled programs at the European Association for Quality Assurance in High Education (ENQA-AEAC) and European Association of Universities (EUA-AEU), which are concentrated on the relation between quality assurance, public responsibility for High Education and Research and High Education rule.
The quality in High Education has to correspond academically and disciplines community demands, as well as to society wants and requirements, Education being part of society.
The last must include ethics rules and opportunities for personal development and no less than to assure possibilities for whom that make studies by their innovations simulation.
The quality assurance must contribute to training recognition in European Space of High Education, which requires is adequate information concerning education quality and its results, as well as the close cooperation between training acknowledgement agencies and quality assurance agencies.
The High Education quality can be defined as an assembly of educational process features and special features (in those formations are implied all available resources and medium factors) which confers the capacity to satisfy some current and future necessities in knowledge, skills, performances of some persons, societies, factories and state.
In Romania, the High Education quality became a priority, which means its agreement (as process, system, result) to many norms, objectives, and necessities.
The performances in achievement of this imperative can be obtained only in systemic and complex approach case of Education quality (figure 1)

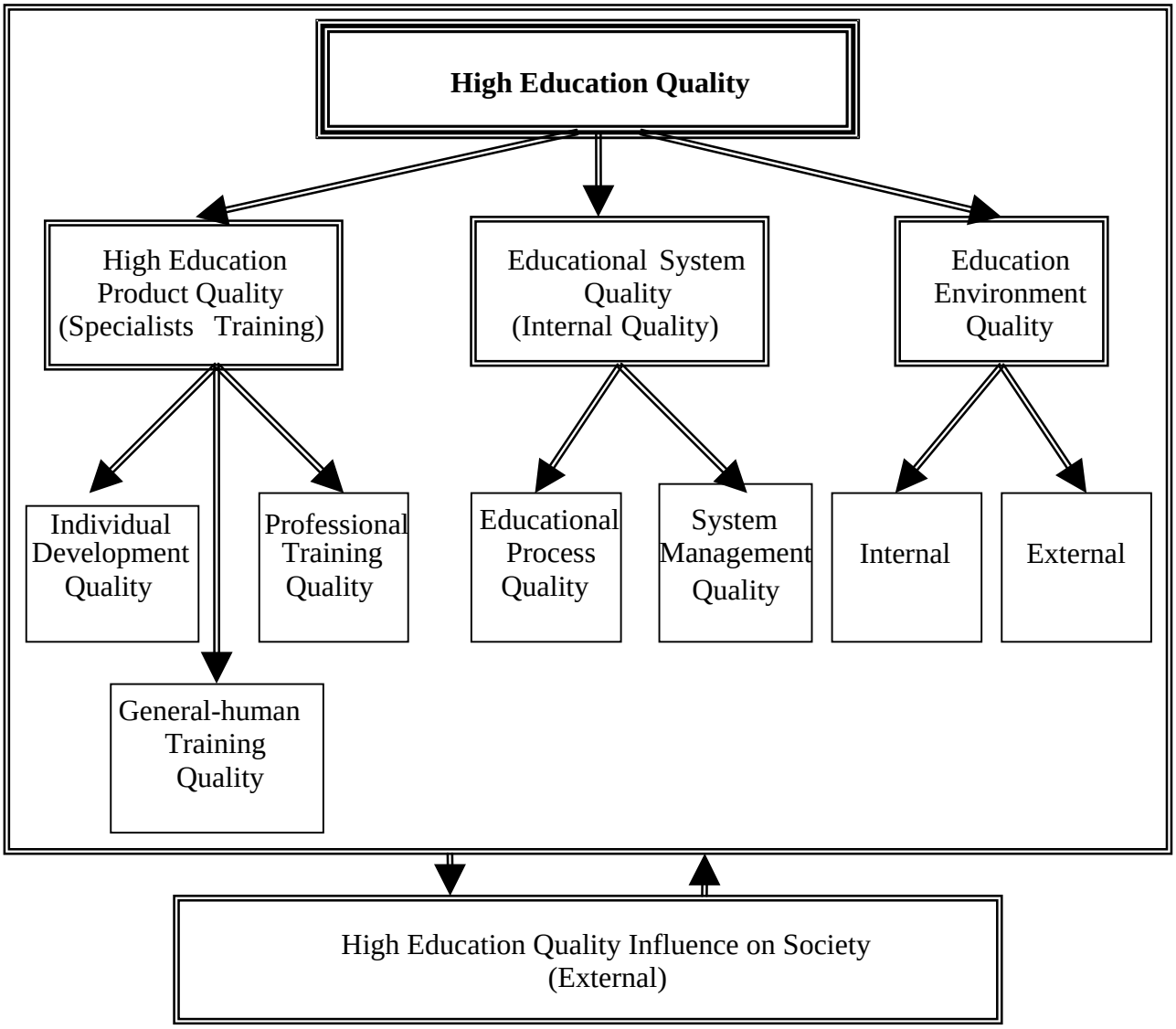

Figure 1. High Education Quality Interference

2. CONTENT

The superior education represents a performing activity, which is made in the society benefit. To be efficient it must satisfy the real necessities of society. The society is in a permanent change and it is objectively necessary that the services performances offered by higher education should be major modified in concordance with these changes appeared in society.
Technical University Education is an important activity of society that joined by techniques. Techniques, the ensemble of the means and know ledges used by humanity for made of goods and services necessary to society, is the engine of last progresses, being in a permanent change not only as structure, but also as and content. Structural changes of techniques are reported at modification of rapport between quantities from different fields of technical activities and number of technicians involved in these. The change of techniques content represents the change of knowledge level materials used, performances obtained. In keeping with structural changes of techniques, technical education must change the structure in the

same time. This means that the weight of different sectors of technical superior education must follow the modification of techniques structure so that to anticipate the changes in nature of technicians activities (including engineers). The changes of superior education content must follow the changes in content of techniques. This means changes in curriculum and in programs structure of different educational activities so that the changes from its nature should use educational means.
For Romania these are internal necessities, but and external which will change structure and content of technical activities and explosively changed.
In the structure of technical activities is a visible orientation for the development of services activity relative to material goods production in the conditions of increased competition in the market economy when the private property becomes prevalent and the level of products quality services and goods) are essential for companies survival. In the content of the technical activities is visible a notable change favourable to use of super-technologies, automations, having as final scope the increase of quality and productivity. As result, the content of the engineer's activity is essentially changed.
European integration of Romania imposes an accelerated modernization of technical activities. This cannot realize without to offer the adequate knowledge to the specialists with superior education. In 1999 is elaborated a unitary model of a future system of superior education from EU. These have many similarities with those of UK and USA having three cycles. Bologna Model gives the possibility to obtain the progressive knowledge to graduates in concordance with the work content what they made.

2.1. Engineering activities type in Romania at the beginning of the XXI-century.
For rational establishment of education content in three years in Romania conform to Bologna model must made an analysis of that people with technical superior studies, engineers, made in Romanian economy now. Engineers work in the goods productive companies (25%), in other execution services (50%), in research-development activities (12%), in education, including superior education (8%), non-technical activities (5%). The size of different activities domains are approximately and was used nonofficial information sources (figure 2.).
In the figure 3 is given an example with the activities nature made by engineers in the mentioned occupations and services categories.
The content of the learning knowledge in all three cycles fit better with the mentioned scopes for each step of system.

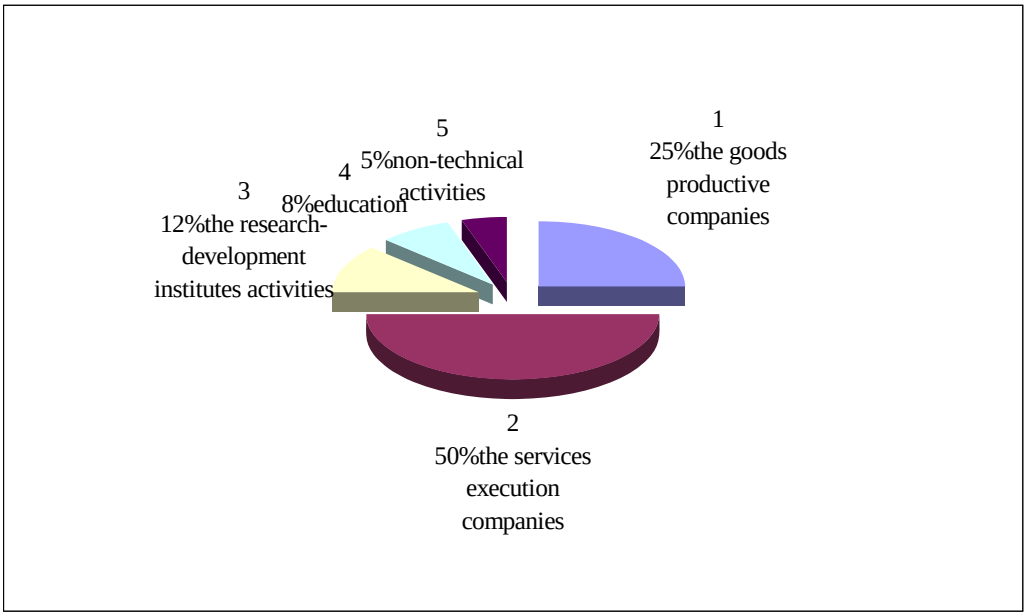

Figure 2. High Education Quality Interference

The first cycle must offer to student a general Engineering Education making able to achieve all jobs mentioned in the chapter 2, on the different complexity levels. They must obtain, for example for Mechanical Engineering, basis knowledge about Theory of Systems, only these mathematical knowledge which are necessary to understand knowledge from the first cycle, use of computers, basis elements of Physics / Chemistry for technical activities (mechanical, electrical, electronically, thermo-technical, science of materials), basis technical knowledge of technology, mechanisms and other machines, the automation of the processes, strength of materials, elementary knowledge of management and use of human resources.

The second cycle (master) must offer not only more details for special knowledge, but also and multidisciplinary approaches. The special knowledge must join with constructive solutions for different domains, specified technological processes and constructive and technological technical conceptions. The multidisciplinary fields can be, for example, special chapters of Mathematics, Physics, Informatics, Mechatronics, Advanced Technologies, Artificial Intelligence. An important point of activity in the second cycle must be individual research of students guided by professors.

The third cycle, that of PhD, must stress, in specially, individual research made by trainers for doctoral degree. The efficient preparation of similar doctoral courses must be the condition for a certain university to obtain right of doctoral cycle organization and for a superior qualification of PhD guiding professors.

In specially, it must mention knowledge to computer use, Informatics and Artificial Intelligence, which are essentially for a modern engineering education. A gradual increase of capacities for calculating of students in the different cycles offers an important defining of necessary learning activities content. In the first cycle, the students must learn to use existent programs. In the second cycle, they must be able to elaborate an original program based on existent knowledge. In the third cycle, they must be able to elaborate new knowledge, which can be used for creation of original programs.

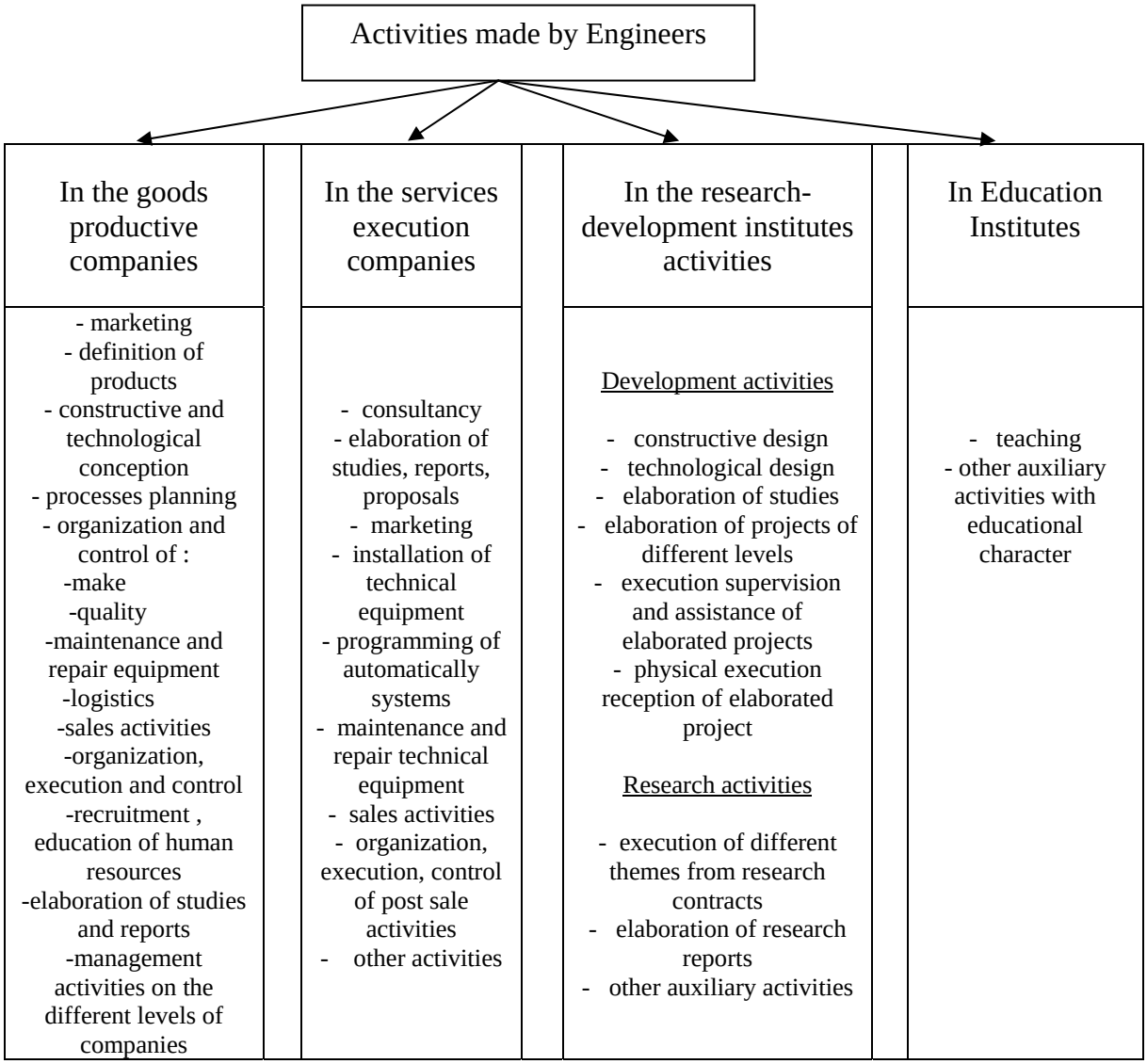

Figure 3. Engineering activities

2.2. Superior education from Romania in the technical graphics field conform Bologna Model

The education necessity in the Graphics domain in technical universities from Romania is based on the social-economical development anticipation of country. Conform to the integration way of Romania in EU and the social-economical life homogenisation in European space, the need of prepared humans in the goods productive and services domain increases. Not only existent and functional industrial systems, but also those are restructured need to “engineers” capable to development their activities. They must be educated in the technical universities, which functions conform to Bologna Model. It cannot develop a technical culture without technical Graphics notions. “Engineer” must obtain abilities to read and write in a unitary technical language. Without this knowledge, he cannot “read and understand technical systems”. The grave problem is not that to represent technical ideas, but that in which has not existed possibility to ”read “ and correctly interpret technical ideas.
In the first cycle, it is necessary that the student should obtain general knowledge of Descriptive Geometry and general rules of graphical representation (technical drawing). It is indicated that these notions should be correlated with representation by computer.

In the second cycle, it is necessary to the specified knowledge for specialization in which is made master. For example, the representation for rules of mechanical parts by computer, from Mechanical Engineering profiles. It must learn specific 2D and 3D modelling knowledge parameterised by computer. Even if almost all technical products used in Romanian society will be not produced in Romania, but they will be imported, it is necessary to the specialists, which occupy to their command and utilization. An image offers more information than many words. In the second cycle, it is good to more diversify the educational offers set in Graphics domain and to develop the education systems in design and multi-media.
In the third cycle, the doctoral stage, it is necessary to obtain modelling, optimisation and processes simulation abilities, depending on respective profile.

3. CONCLUSION

The education in the technical Graphics domain in the Romanian high education is obviously necessary. For obtaining this task, it must make analysis at the specialists staff level in the universities from Romania, to pick up options of students and, then, to elaborate programs in concordance with Bologna Process orientations. An important role must have and members of "SORGING" society (Romanian Society of Engineering Graphics). It is valuable the responsibility and liberations assuming of each university but so that should permit crediting and mobility of the students conform to the actual requirements. In specially, it is necessary to take account of institutional autonomy principle, the principal responsibility for quality assurance in high education depending on each institution. This assures the basis for real responsibility of the academic system as part of national quality framework.
Maybe for the adaptation of the new programs it is necessary the following:

- a definition of the responsibilities of persons and institutions involved;
- the evaluation of the institutions programs, including the internal evaluation(auto-evaluation), the participation of students and publishing of results;
- a system of accreditation, attesting or comparable procedures;
- participation, cooperation and work in the international nets.

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