Desirable performances and limits of students' assessment in engineering education

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Abstract: Assessment was always a controversial operation. Even more so now, in the context of the changes required by the Bologna process, students' assessment must be an act of high correctness and accuracy. Also, the requirements addressed by the society to the education system are aligned to the current requirements of the global society, so that assessment is a very important chapter also for the individual's evolution. The paper aims to emphasise the main points of the assessment currently being carried out in the technical education system, bringing also a series of possible solutions and remedies. Thus, it presents the possible sources of errors, as well as the main disturbing factors of the educational process, given the fact that the change proposed by the Bologna process is one that requires other capabilities and competences from the university graduate.

Key-Words: education, curriculum, assessment, disturbing factors, competences, professional standards

1. Limits and subjective factors of the assessment

Assessment was always a controversial operation. Because by the way in which the assessment is made, the fate of an individual is decided, it obviously has a high moral charge. The university certifies to the graduate certain competencies, by which he has the right to carry out certain activities and to occupy certain positions. Therefore, the importance of assessment is indisputable.

The problem emerging from these considerations is to find the ways by which the assessment in the education system becomes as rigorous and correct as possible.

The current assessment types in the university-level education seem to not be useful to the students for the acquiring of the competencies demanded by an academic environment, namely creativity, critical spirit, initiative, autonomy and responsibility. Currently, the concrete assessment methods are focused on the testing of the capacity to acquire theoretical, arid information, that lack a direct relationship to reality. Therefore, we can talk about purely theoretical, dry knowledge, without importance for their future professional life.

Moreover, the labour market itself demands from the graduates another kind of competencies, which are very far from those used by the university assessors. This is because the university assessment system uses exams that focus on descriptive knowledge, trying to make a selection by means of the explaining, by the student, of the stuff taught to him. Such an assessment is based on the memorising of knowledge, on the faithful reproduction of the course contents, without a recourse to thinking operations such as analysis, synthesis, comparison etc.

Certainly, assessment is not done identically by all professors. Starting from the interpretation of university autonomy, each professor, in the name of individual liberty, organises the teaching activities and the exams according to the criteria that he considers to be the best fitting. Thus, instead of having integrated exams, common for a wider group of professors, by which the actional competencies and the procedural knowledge, that are mobilising for the action, are analysed, we continue to promote the same reproductive exams systems as in the past.

Another variable of assessment is the studied discipline, through its particularities. Assessment differs from one faculty to the other, from one study field to the other and even within the same field. The criteria by which assessment is done are different from one professor to another, because the referencing is done with regard to different reference systems. But even if these would be identical, the importance granted to certain elements is different.

There should not be forgotten the subjective factors of assessment, the academic environment having in this regard the task to minimise their influence as much as possible.

Among the main distortion causes in the assessment process, one can mention:
- the particularities of the professor-student relationship, on the affective-attitudinal component;

- the errors appearing as a consequence of the specifics of the discipline where the assessment is carried out;
- the insufficiency of information used for the assessment;
- the erroneous selection of assessment methods and strategies related to the assessment's objective;
- the inadequate teaching style (lack of experience, inability, lack of knowledge, lack of pedagogical tact);
- direct influences of the psycho-social environment where the assessment is carried out;
- the appearance of stress and anxiety states in students;
- influences of the pedagogical context in which the assessment is carried out;
- the involvement of personality factors, both for the professor (severity/indulgence, temperamental traits, character traits etc.) and for the students;
- the occurence of assessment errors etc.

As a consequence of these distortions, we can talk about several instances of a defective assessment:

1. the grading as a sanction – realised by means of small grades, starting from reasons that do not take into account the student's level of knowledge and meant to punish an inadequate behaviour;
2. strategic grading – manifested through granting mainly small grades, targeting either the "motivation" of students, or the maintaining of the group's control. In a continuous assessment, the professor grants to the students only small grades, which he later no longer admits, cancels or, worse, modifies;
3. speculative grading – by which the maximum of the grades is speculated, starting from unessential elements related to the taught contents;
4. label-grading – by which certain patterns are created with regard to the students' possibilities;
5. invariable classification of students – by which, even if a student labeled as "poorly prepared" knows more, or a student labelled as "well-prepared" knows less, the grade is granted according to the label;
6. tendency towards indulgently assessing known students as opposed to the newcomer, who is regarded with suspicion and reserve;
7. the professor's wish to present the students' results at the superlative mode, as a proof of the "quality" of his teaching performance;
8. influence induced by a student with a pleasant physical appearance and with a good diction – by which the professor grades rather based on esthetical criteria;
9. over-evaluated answers due to the novelty of the answer or of the situation;
10. the professor's whims, his state of mind, his disposition, favouritism etc.;
11. the assessment of a good student after a poorly prepared one or vice-versa, which leads to the grading of skills and/or the punishment of their absence, which is not correct;
12. the tendency of junior professors to give only medium-level grades, avoiding the extremes out of fear to not exaggerate the grades towards the plus or the minus;
13. the tendency to realise a comparison and a hierarchisation of the students;
14. the professor's tendency to show his superiority versus the students by means of persecutions and intransigence;
15. structuring of own grade assessment criteria, by which some professors use the grade for encouragement, while others use it for constraining.

Another limit of assessment in the technical higher education system is the organisation manner of the university studies cycle, through the contents, importance and weight of the various disciplines in the curriculum. Often it can be noticed that the elaboration of curricula is dependent on the interests and aspirations of one or more persons, rather than on a detailed analysis of competencies needed by the future graduates. Therefore, often the educational offer represents the personal initiative of the faculty member, in direct relationship with the development of his academic career.

2. Towards achieving the desirable performance

Taking into account the short overview presented above, it is necessary to devise a series of concrete ways to minimise the defective assessment as much as possible. In this regard, the analysis must start from clearly defining the finalities of the educational activity. Thus, the graduates' competence profile must be outlined through the curricular offer. This facilitates not only the internal assessment, but also the external one, in this way allowing a regulation of the curricula according to the requirements of employers or of the labour market.

Another measure is related to the judicious choice of assessment criteria. As starting points, we can take into account following elements:
- the volume of knowledge acquired by the students by attending the courses, the correctness and completeness of the knowledge;
- the accuracy and the level of the speciality language employed;

- the capability to operate with the gained knowledge in new learning contexts;
- the capability of analysing, synthesising, combining, extrapolating etc.;
- the capability to find new solutions to problems occurring in the learning activity;
- the communication capability and the capability to work in a team;
- the flexibility towards changes;
- the attitude towards studying and motivation of learning;
- work discipline and responsibility etc.

In the order of importance we can then refer to elaborating standards with their performance descriptors, with the help of which the assessment of the level of realising the final competencies can be achieved, thus being facilitated the future elaboration of assessment tests for each discipline from the curriculum.

In order to minimise the weight of subjective factors, several recommendations can be made, such as:
- knowing and taking into account the subjective factors in order to reduce their influence to a minimum;
- adjusting the behaviour of the faculty member in order to achieve a dramatic diminishing of these factors;
- determining, by means of didactic design, of operational objectives that are adequate for the finalities of the educational activity, in direct relationship with the learning contents, with the available human and material resources, with the expressed social need;
- usage of continuous assessment methods for the diminishing of hazard and chance in assessment, possibly increasing the number of assessment tests;
- usage of combined assessment methods, possibly using combined tests for several disciplines, in order to allow the monitoring of the student's capability to operate interdisciplinary;
- forming the students' capability of self-assessment, in order to help them to discover the strong points and the weak points;
- ensuring the anonymity of assessment tests, in order to reduce the grading subjectivity.

3. Conclusions

In the absence of a precise and clear vision on the competencies which the students are expected to acquire, we obviously speak about a truncated assessment and, related to this, about a poor quality of the education provided by that faculty.

If the traditional education went along the line of a normative assessment, in the course's spirit, the current society demands from education the realising of a formative assessment, as an integrant part of the education provided by the higher education system. The normative education was based on the principle of separating the learning activity from the assessment activity, measuring knowledge without any relationing to the student's experience. To the contrary, the formative assessment conceives assessment as an integrant part of learning, and the measuring of competencies is done based on complex and real tasks.

Another argument in the diminishing of normative assessment is the need to relate it to the clearly defined objectives of the teaching activity and, in this regard, the definition of criteria that condition success. These criteria must be communicated to the students from the very beginning, so that they know on what to focus in their academic training.

An algorithm that would be observed during assessment by any faculty member, regardless of the discipline he is teaching, implies the respecting of several requirements, such as:
- analyse to what extent the course's scientific contents and the employed assessment methods are adequate for the course's objectives and finalities. In this regard, clearly define the competencies that students have to prove, the knowledge they must posses and the minimal level at which these can be considered to have been acquired;
- clearly define objective, in order to put students in the situation of having to prove the competencies gained in various learning situations;
- analyse the competencies that you wish to assess and define the assessment objectives that would emphasise these competencies. Thus, for example if you want to assess the student's team working manner, rely on the mutual assessment and on self-assessment, so that students can reflect on the own experience and can use it also in the achievement of other objectives;
- discuss the assessment topics with the prospective employers, in order to realise an agreement between what is sought by the actual assessment and what will be demanded of the students upon starting their job;
- take into account the students' opinion regarding the assessment and the ways in which it could be improved.

Not least, at the institutional level, there has to be created a framework for the professionalisation of the assessment activity. For this, an institutional culture regarding the assessment must be realised, there must be organised workshops on topics related to assessment, there have to be formed assessment teams in order to provide a wider framework for this activity.

Also, the cooperation of several professors from the same study field in elaborating common exam topics would be useful, thus targeting the manner of achieving general or final competencies by the students.

As future directions for this work, there can be mentioned the need to realise interdisciplinary "test batteries" and to apply them to students, in order to see how they achieve the assessment's objectives. Their realising must be based on emphasising the students' creativity, their critical thinking, the personal initiative, competencies which would then be required on the labour market, at their employment.

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