About the Quality of the Evaluating Students' Knowledge Process

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Abstract: Evaluating the knowledge of the students is a necessary process, which shows to the teacher the level of appropriation by the student of the taught notions in the framework of an educational course.
Technically speaking, the evaluating process is a complex measuring act of the quality and of the volume of the student's knowledge.
The paper deals with the following subjects: the necessity of the students' knowledge evaluation, what must we evaluate?, what are we evaluating?, what is not evaluated?, how can we evaluate better?, how can we marking the knowledge?

1. Introduction

Evaluating the knowledge of the students is a necessary process, which shows to the teacher the level of appropriation by the students of the taught notions in the framework of an educational course.
This evaluating process provides feedback signals of the educational process, showing the quality student's knowledge in the specialty is considered.
Technically speaking, the evaluating process is a complex measuring act of the quality and of the volume of the students' knowledge.
But how are we doing this, what devices and instrumentation have we at our disposal, what way are we proceeding to measure this complex value of knowledge?
More or less, each of us has passed many exams and has participated as examiners in many other ones. Each time a series of questions have existed in our minds about the accuracy of the examination act, about the measure in which our mark managed to express in the best way the level of the student's knowledge. We think we will express more than only our own opinion saying that to evaluate a student's knowledge is a very complex and responsible process, not always satisfactory, many times doubtfully.
Besides the subjective causes there are some objective ones, reasons we would like to underline in the following, about the nowadays deficiencies of the evaluating students' knowledge.

2. The necessity of the students' knowledge evaluation

Is it necessary to evaluate the student's knowledge and why?
The student's knowledge evaluation is firstly necessary to the student himself, to know the level he is being, the mistakes he is making in the improving process of learning. For the human society, the evaluation ending with marks is important as act of justice, because the educational process is a hard competition, the results of which must be known both by the competitors themselves and by the contributors.
As well, the evaluation is a qualitative measure of the efforts made by teachers. The marks obtained by students are partially ratings attributed to the activity developed by their teachers.
Thinking of the later feedback effects, the evaluation of student's knowledge is a very responsible act related to overall human society.

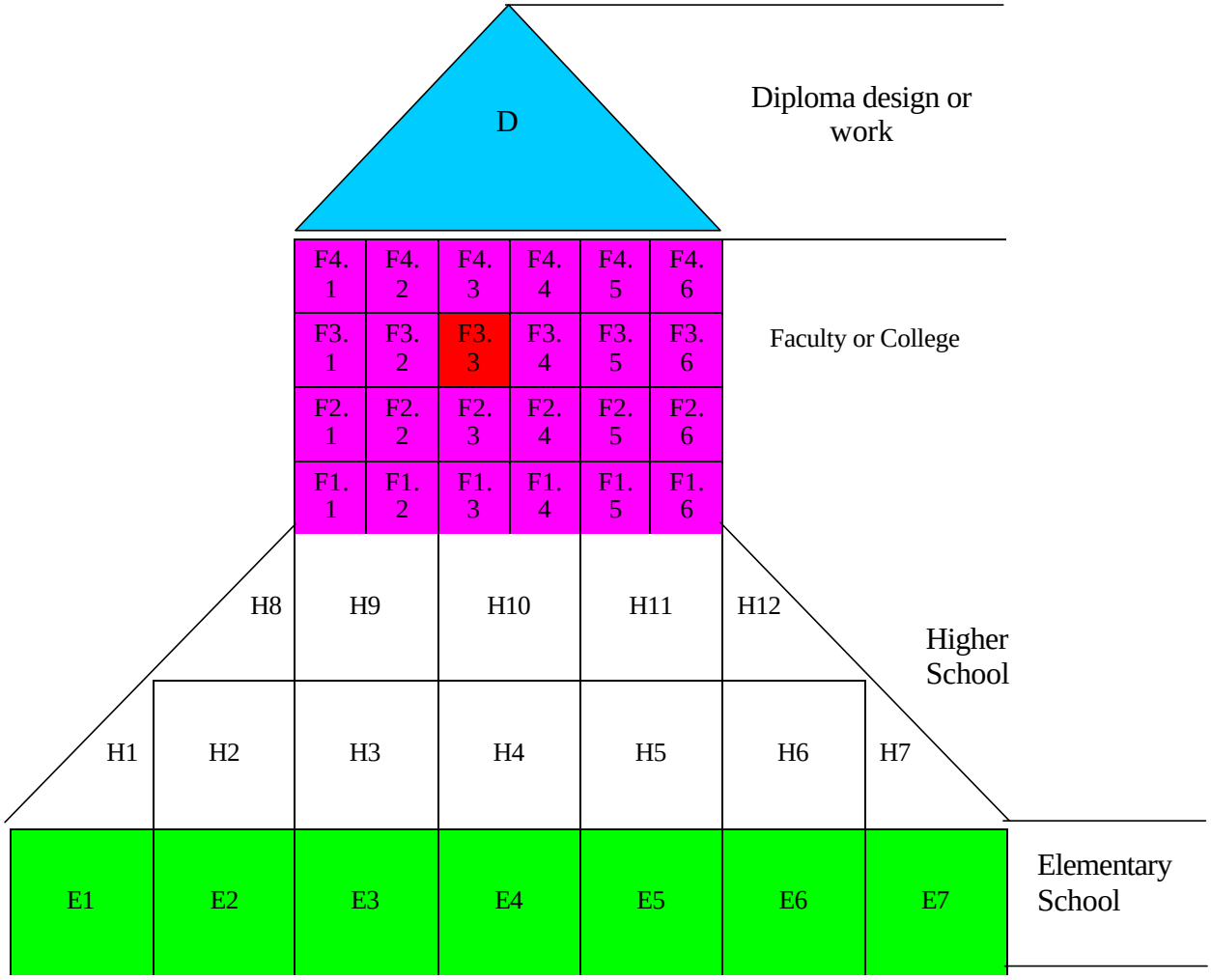

Fig.1. The structure of engineering educational process.

3. What must we evaluate?

In the evaluating process, the examiner must verify the level of knowledge in specialty area, that one which the teacher has thought the courses in.
This checking act has the purpose to establish how the student is prepared to face with the problems encountered when he is solving practical requirements of the solution to be considered. Of course, this verifying act is a very complex one, because the examiner has at his disposal a very short time (in Romania 20 minutes per exam) to establish how the student will react when he will meet a specific problem in practice.
I the followings we will refer to fig.1, which is trying to represent graphically the engineering educational process. We have denoted by E the courses of elementary school, by H the courses of higher school and by F the courses of faculty or college.
We must underline that an evaluating process is related to only one strictly delimited volume of knowledge (for instance F3.3), it is not covering the entire area of knowledge which student needs to solve a practical problem. To use a simple instance, a physical application of a body movement use in the same time knowledge from the language area, also from mathematics.
So, during an evaluation, the examiner have to delimit the boundaries of the checked area, but we have to realize that this delimitation is arbitrary and in part subjectively. We can say that for a grade of examination, we are considering as being obligatory a certain amount of so-called general knowledge, the task of the evaluation in course to be considered being to establish how much and how well the knowledge of that course was understood and stored by student.
In the scheme of fig.1 each course of higher school and of faculty or college is based on the below situated courses, the rank of storing and understanding being F, H, E. Inside each H or F area there are some relationships of ranking, a part of courses being dependent of the others situated below.
For instance, the course F3.3 to be considered is based partially on the some courses of F2 and F1 level of faculty or college. Also, to learn the course F3.3 are necessary a part or all the courses of higher and elementary school.
We can put a simple question, present in many minds of students and parents: all the courses of levels H, F1 and F2 are necessary to learn the course F3.3 or only a part of them? To answer this question we have to show that learning process has a storing knowledge side, which is the course F3.3 is based only on a part of courses F2, F1, H and E. But there is another side of learning, connected with the brain capacity to work, to ration, to understand and to store the knowledge. Having in mind this side of learning process, maybe all the courses of the below situated levels are useful to assimilate in the best way the considered course F3.3.

4. What are we evaluating?

For the very short available time of checking, the examiner is obliged to use some formal procedures of exams, which are related to:

- the memorizing capacity;
- the skill of expressing oneself;
- the reasoning capability;
- the persuasion ability;
- the interest manifested during the courses;
- the general look of the presentation;

5. What is not evaluated?

When we are marking a student in one exam, we are not able to evaluate:

- the creative capacity, that is the most important feature of every engineer;
- the ability to solve quickly and in the best manner the technical or managerial problems that occur in the daily activity of a company or an institution;
- the general level of the student's knowledge, that so-called „general knowledge", very important, maybe essential for every one of us;
- the moral fiber of the student, that is the overall his moral features, all of us knowing that in the daily activity firstly stands the morality and then the professionalism.

6. How can we evaluate better?

To evaluate better, that is to have the possibility to appreciate the features for that now we have less evaluating modalities, like the creative capacity, the managing skills, the general knowledge and the moral fiber, we have to put the student in the conditions more closed to economic activity. We see that the evaluating students' knowledge process is directly connected with the matter of engineering education. The evaluation will be better and more completely done if we will apply some solutions of approaching the engineering education to real economic activity. Only seeing how the student is behaving in so-called real conditions of work, the examiner can evaluate more completely the overall engineering skills of him.
In other words, to create conditions of a better examination, we have to improve the curricula, applying one or more solutions of combining the engineering education with economic activity, like sandwich education, where the first and second year is for education, the third for economic activity and the fourth one is again for education. Another solution we know is the existence of a kind of small factories, managed by universities, units in which are working many students.
In this kind of curricula can be evaluated better the engineering skills and knowledge of the students.

7. How are we marking the knowledge?

The marking of the knowledge is a more or less objective act of evaluation, aiming to rank the students by their knowledge. We are afraid that this evaluating act has as results more relative values than absolute ones.
An important role of marking is the stimulation of the students to be better, to learn more, to out do the colleagues, to encourage the loyal competition.
There are letter marks, like A, B, C and so on or number marks in a decimal or other system. Also the marking can be done by accumulation of a number of points n_a from the maximum possible number n_p. The resulting mark equals n_a/n_p ratio, that is the above mentioned decimal system, but calculated more exactly, with decimal fraction.
The ranking of the students by their mean general mark can be done only if we are utilizing the number mark systems, so to be able to calculate the average values.
In Romania is commonly used and most utilized the decimal system of marking and sometimes the system of accumulation of an amount of points, related to a maximum possible number of points.
He have to underline that the marking of the knowledge is part of the general need to express quantitatively the quality of education.

8. Concluding remarks

The evaluating students' knowledge process by marks is part of the general need to express quantitatively the quality of education. It provides feedback signals of the teaching and learning processes, showing the quality of the knowledge achieved and stored by students.
The student's knowledge evaluation is firstly necessary to the student himself, to show the level he is being, the mistakes he is making in the improving process of learning. For the human society, the evaluation ending with marks is important as act of justice because the educational process is a hard competition, the results of which must be known both by the competitors themselves and by the contributors as well. Also, this evaluation is a qualitative measure of the efforts made by teachers; the marks obtained by students are partially ratings attributed to the activity developed by their teachers.
Having in mind the later feedback effects, we can say that the evaluation of students' knowledge is a very responsible act related to overall human society.
During an evaluation the examiner have to delimit the boundaries of the checked area, but we must to realize that this delimitation is arbitrary and in part subjectively. For a grade of examination, we have in mind as being obligatory a certain amount of so-called „general knowledge" or previously grounding. The task of an evaluation in a course is to establish the grade in which the knowledge of that course was understood and stored by the student.
In a curricula with 4-5 years study, for the very short available time of checking, the examiner can evaluate only the memorizing capacity, the skill of expressing himself, the reasoning capability, the persuasion ability, maybe the interest manifested during the courses and the general look of the presentation.

But in that short time of examination (in Romania 20 minutes per student) the evaluator cannot appreciate some fundamental engineer's features, like creative capacity, the managing ability, the general knowledge or the moral fiber of the competitor.
Only if the universities are using a strong connection between engineering education side and the productive one, only where the students are working in some productive departments or factories, the evaluation can be more complete and satisfactory. Only this way the evaluation can be of high quality and a responsible act face to the contributors, who are paying taxes for the state engineering education.

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