

The Media as a Complement of Engineering Teaching

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Abstract: The world we live nowadays is a fast growing up world, and this is all because the quickness in which information is transmitted. In the great-engineered world, media is always publishing technology developments all over the world, a general interest for anyone.

These new technologies are widely spread among the media. For those who get to know them and do not understand properly the right use of innovations, it all became useless. Students also feel those difficulties, or rather only lack of teaching to raise the ability to understand the enormous opportunity of extra-curriculum knowledge in these innovations.

This work will present a methodology rather simple, but also efficient, aiming the integration of the engineer with the society, in an attempt to make science and technology application more accessible nowadays.

Starting from an activity that makes use of news from media (internet, radio, TV, newspapers, magazines, etc.), we wish to prepare students for a critical explaining sense, in a way to make them capable to thinking and discussing the new technologies developments together with the society.

In the end of the work, the results will be presented based in the fuzzy model accomplished during the last two years in which the present work is been held.

Keywords: engineering, education, media, multidisciplinary

1. Introduction

The world we live nowadays is a fast growing up world, and this is all because the quickness in which information is transmitted.

Globalisation turned the media into its first way of divagation. Therefore, technology innovations are widely spread through the world in a fast and immediate way, mainly due to World Wide Web (Internet), which brings all nations together, not only personal computers, but also the big enterprises networks systems.

Since that, it has been noticed that two items are becoming essential in the development of the engineer career: the need of extra-curriculum knowledge and the formation of multidisciplinary teams.

In the engineering, independent of the area, the communications ways are always publishing technology developments all over the world, general interest for anyone. For instance, we have all the discoveries from the Hubble telescope, expanding the universe frontiers; the development of new medical equipment, designed to prevent and diagnose early diseases, making use of 3D images; household supplies with new technologies, bringing comfort for our houses and office; new intelligent buildings and houses, combining comfort and safety; automation of high hazardous services; automation of high demanding precision services, etc.

Although all these facts are widely spread among the media, for those who hear of these developments and do not understand properly the right use of innovations, it all became useless. Students also feel those difficulties, or rather only lack of teaching to raise the ability to understand the enormous opportunity of extra-curriculum knowledge in these innovations.

This work will present a methodology rather simple, but also efficient, aiming the integration of the engineer with the society, in an attempt to make science and technology application more accessible nowadays.

Starting from an activity that make use of news from media (internet, radio, TV, newspapers, magazines, etc.), we wish to prepare students for a critical explaining sense, in a way to make them capable to think and discuss the new technologies developments together with the society.

In this way, we believe to graduate a new professional engineer for the 21st Century, capable to link technical development and society. And to reach this goal, it is indispensable to form a multidisciplinary team during university years.

In the end of the work, the results will be presented based in the fuzzy model accomplished during the years in which the present work is been held. We opt for this model, as we all know how difficult it is to evaluate variables exclusively qualitative, even though it is possible to give them marks, through a planned gathering of data.

2. Methodology

The proposed activity presents the easy applicability, and the student's evolution capacity to comprehend better the real world, as its main characteristics.

It is also important to show that all the theory learned at university can be used in a practical and functional way, thus not always it is needed to use pen, pencil and calculator to discuss about a real event, inside group presentations or outside them.

We believe that those who accomplish a graduating course in our country, a small percentage of our population of about one hundred and seventy thousand inhabitants, have the obligation to assume a professional posture not only in the companies they are working for, but also and essentially in front of the society.

The engineers, in the beginning of new century, must be the instructors of the new technologies, which emerge daily extremely fast. Nowadays, not only does the professionals themselves, but also those far from the hot information may not follow and assimilate well the innovations. Therefore, it is our role to be the public speakers of these information, explaining them in an accessible and easy way, with no need to use all the complexes theorems and calculus studied at university.

Furthermore, there is an increasing interest of the students in the evolution of the activities, since it is notary the approaching of the aims, as the activities take effects.

The activity is strongly based in some principals like successively training of a skill, feedback of performance and individual analyses among teachers and students.

First of all, we chose technical social articles, which is presented to the students, distributing some Xerox copies for them, or projecting it in slides, in a planned class for the activity, where the students do not necessarily know what would be done.

Following, it is asked that everybody read the article in a certain period of time, coherent with the size of the article. After all, in ten minutes, the student have the opportunity to think about the subject, and write down in a sheet of paper their feelings, views, solutions, etc, in a fast and objective way.

The fulfilling of the given time for thinking and writing is extremely important for the coherent gathering of data and with validity for future comparisons, and also to permit the analysis of the evolution of individual performance, as well as the group itself.

After this time, the sheets are handed in, and then starts others stages and aspects of this activity.

Afterwards, the teacher comments the subject, raising his opinion according to the activity phase, or rather, if the subject is technical or not. This feedback should be made in a rapid and objective way, in order to show students exactly the reference point desired with the technique.

It is also advised to make individual feedback for all, with a view to start the gathering of data for future analysis of evolution and development of the technique.

These feedback sessions may not be done just before the end of the activity, once the length of a class is not that long. Nevertheless, they should not be forgotten, as all the students must have knowledge of the results gained and the improvement achieved. Without the feedback, all the technique would lose its sense.

From this point, a free debate could be proposed to the class, giving the students the opportunity to support their point of view, so that everybody could learn from the opinion of the colleagues, developing with this the criticism and self-criticism of all.

It is profitable and curious to conclude, in the end of the analyse, with the agreement of all, "what the class have learned from the subject presented?"

It is interesting that students want also to know the results achieved from others classes, in order to contrast opinions. We imagine that, what would be even interesting, but unfortunately we did not succeed in implementing yet, one different teacher, who gave classes in another institution, and also develop this activity, could be invited to participate in our schools, to share information, not only among the groups inside the school, but also with others distinct schools, so that we could conclude regionally.

Another important aspect is the high demanding of multidisciplinary and interdisciplinary knowledge involved, since starting from the discussion of technical subjects related to the studied area, we will reach discussions of technical subjects not related to the studied area or the activity of the students.

To describe the sequence of phases, let us suppose, just as an example, that the activities ate applied in a class of electrical engineering students.

Three phases are described below:

Phase 1. Related Technical Article

In this phase, a technical social article is chosen in the media (newspapers, magazines, etc.). It is important that the chosen article has reference to the area of formation of the students, to let them at ease and used to this activity. The intention here is to train the criticism sense, with the study of their performance, when it comes to discuss a known subject.

Therefore, we try to relate the technique focus related to the studied area versus a technical article related to the studied area.

As an example, we could bring the discussion of a technical article about nuclear energy.

Phase 2. No Related Technical Article

Here another technical article is chosen, but in this moment, the subject is rather different from the studied area of the class of students.

It will allow the first multidisciplinary phase in the application of the discussed methodology.

A new relation is desired here: technical focus related to the studied area versus no technical subjects not related to the studied area.

As an example, we have the discussion of a technical article about problems in the structures of aircraft.

Phase 3. No Technical Article

In this phase, a high level of multidisciplinary and interdisciplinary interaction is achieved, as is aimed here the discussion of several technological subjects, not studied or less quoted in the traditional engineering courses.

The new relation here is: technical focus not related to the studied area versus technical article not related to the studied area of the class.

The following points may be discussed:

- What is engineering in this article?
- What are the engineer thoughts about this subject?
- How could we analyse something in a logical point of view?

As an example, we could present here an article about the cloning of human genes, typically, a biological subject.

3. Technique Evolution

During the accomplishment of the activities, according to the phases presented in the methodology, some doubts may emerge:

When could we pass from a phase to another?

There are many variables to evaluate here, for instance, the number of students, as in small groups, the activity goes faster, simple and efficiently.

There is no hint, in our point of view, which indicates the limit between a phase and the other. In this point, the head teacher must have the sense to look for equilibrium, to make the phases not too repetitive, long and exhaustive, which non stimulus to the students. It is good to remember that the motivation of the group is the support point of this activity.

For us, a good time to forward in the next step is when we realise that the partial objective was reached, bearing in mind that the final objective has an evaluative and sequential character.

How to keep the activity on fire?

With the successive application of these activities, we make the students grow gradually in the proposed multidisciplinary and interdisciplinary objectives. With no doubt, it is possible to encourage students giving feedbacks, this way making them realise their developments in the context. The better encouragement is when they realise that they have the capacity to understand and apply their knowledge acquired in university, in a practical way, daily, in any environment.

4. Results Analysis

It is very interesting to notice how students from different formations, reach conclusions quite similar about determined subject, which not refers to their formation and specialisation.

It is noticed that, truly, we wish to rise the criticism sense and the analysis capacity of the future engineers, for technical subjects and general ones, trying to focus the responsibility of the graduated professional in the society nowadays.

Nowadays, leadership, dynamism and multidisciplinary knowledge are requirements for a good position in the marketplace, or in the development and leadership of researches. We may call this activity as a constant training with a view to develop student's skills.

It must be clear that many others aspects can be considered and studied, under many points of views, individually or collective, technical or not, combined or not.

Following, we present the results of the referred activities, which were applied between 1998 and 1999, in the electrical engineering undergraduate students at Universidade São Judas Tadeu, by the authors of this article, showing just the collective results of the group. We believe that there is no need to present the individual results here, once we aim to report the technique mentioned. However, it is clear that not only the global results are achieved, but also there is a wide range of individual data for each student. Fig. 1. Shows the collective data for analyse.

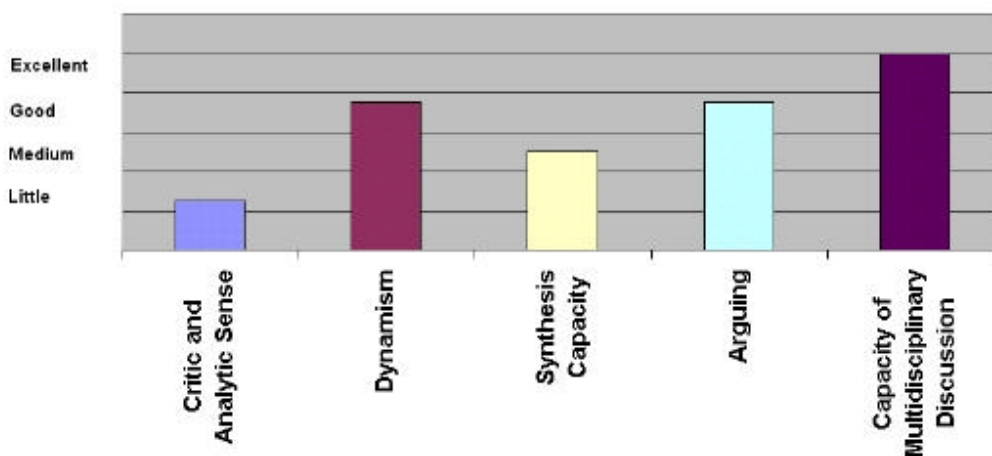


Fig. 1. Improvement of the performance of students

5. Conclusions

The results above show just a small part of the wide range of data we could study and discuss when we apply the technique.

The rise in the multidisciplinary capacity of the students can not be treated as an isolated activity, but a set of activities to be developed in class, evolving students and professors.

Too much is been discussed about University and Third Millennium, and we believe that the human factor is the main point in this process. This is the principal reason for our small collaboration, so mentioned in this article and in others works too, which do not focus only the physical structure of classes, laboratories equipment and other goods (even though they are extremely important), but also the performance of each in society.

For us, the concept of modern and engineer, beside the technically capable professional, is the inner frontiers of the individual, where we aim to expand it in the direction of multidisciplinary and interdisciplinary knowledge, in such a way to transform the engineer of the third millennium into a professional aware of the necessity to follow the velocity in which information is transmitted nowadays.

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