Team-building Approach in a Multi-Campus Institution

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Abstract

This paper presents preliminary results of a team-building approach across two campuses of DeVry Institute of Technology; one in Atlanta, USA and the other in Toronto, Canada. The Internet has been used as the major communication tool. The approach is meant to motivate students in carrying out small-scale applied research and build a working team across geographically separated locations.

An outcome example will be discussed; it is a study aid module for analog filter design, a topic that is studied in both campuses by students enrolled in EET-310, Analog Signal Processing course. The study aid module was created by a team of students building on their knowledge in both programming and filter design. It is shared and used by students in both campuses through the Internet. The module is not only shared as a study aid for EET-310, but also for the purpose of further development and for creating other related modules. The approach is planned to be a long-term cooperation between successive classes of EET-310 guided by their instructors at both campuses. A discussion of some of the difficulties faced and suggestions to avoid them will also be presented.

I. Introduction

It has long been recognized that there is more than engineering in the making of good engineers. Over eighty years ago, Prof. Higbie described the attributes an engineering college should equip students with, he stated, in part:

…; to perfect the ability to express thoughts in written or spoken language, readily and clearly, definitely and convincingly, with a measure of simple elegance, …[to develop] a desire to run forward to meet strange problems instead of avoiding them or doing them superficially, … [to develop] regard for the sensibilities and opinions of other people. … The older men of broader vision testify that the real satisfactions of life come certainly to those who have acquired habits of application, persistence, accuracy, thoroughness, honesty, and reliability, observation and coordination, independence of thinking [1].

Prof. Randolph, around the same time, wrote:

*… The old academic method was to have examinations at the beginning and the end of college course and determine from these what the young man knew, but in engineering we must know what a man **can do*** [2].

It is quite obvious that the above statements assert the importance of the attributes now referred to as; communication skills, team work, critical thinking, ethics, applied research, and proven skills. Such attributes are still considered important as demonstrated by more recent studies [3] and are taken into account in assessing quality of education [4]. These attributes are fundamental to the "new" rules of the accreditation board for engineering and technology [5].

The extent of these attributes is usually assessed through a successful completion of a technical project before graduation. The way is paved for the technical aspects of such project by the work done in numerous laboratory courses where students perform experiments with progressive levels of sophistication in both design and analysis. Instructors can form cross-disciplinary teams to promote individual students in technical writings and presentations [6]. Difficulties still occur when students are required to work on projects as a team, particularly if they team with off-campus students using current technology such as the Internet. They may face such a requirement for the first time during their graduation technical project.

The idea presented here stems from the attempt to expose students to teamwork across campuses at earlier stages of their studies. Small doses of cooperation could help building students' skills and confidence to prepare the future graduates to the constantly changing corporate environment.

II. The Methodology

DeVry Institute of Technology has numerous campuses in the USA and in Canada. Students enrolled in these campuses follow the same general curriculum, however each campus enjoys a large degree of autonomy. It is not typical to see students (or instructors for that matter) establishing intra-campuses communications. When such a communication occurred, it was limited to the postal mail, phone, and fax, the communication reported here is Internet-based.

Students enrolled in EET-310 Analog Signal Processing at two of DeVry's campuses (Atlanta and Toronto) were encouraged to technically communicated using the Internet and form working teams although they never meet face to face. These students are in their 6^{th} term of study (out of nine terms required to complete their degree) since the project described here was a pilot project, it was essential that students forming a team to be self-motivated. There were no marks assigned for this activity. Those who contributed found it motivating enough that they can use the activity to enhance their resume through describing their ability in teamwork thorough the Internet. Such an attribute is believed to be valued by current employers [3].

When the idea of an intra-campus project was first introduced to the students, there was mild enthusiasm. Students asked two major questions. The first was how much time they were expected to spend on such a project. The second was how the work was going to be marked. The fact that there were no marks associated with the project reduced dramatically the number of students interested in the project. It did not help that the time to be invested was not expected to be more than two hours per week from each individual student. This loss of enthusiasm was, in

way, understandable, however this phenomenon needs to be rectified in the future. We hope to create motivation through pride in competence. More students are expected to show interest in the coming terms as they see the accomplishment of their previous colleagues.

A relatively small team was formed (three students from each campus). Students were asked to create a program that builds on their knowledge in both programming and analog signal processing. It was suggested to them to consider designing a study aid that could help designing analog filters. The team members were to:

- Select a programming platform
- Design the modular structure of the program and a suitable user interface
- Critically examine the modular work of each other.
- Solicit input from other students on the usability and educational value of the module.

Although the students who formed the team were highly motivated individuals (at least had higher motivation than the rest of their classmates), they still needed direct interventions from the instructors to set goals and overcome some technical difficulties.
This is another point that needs to be addressed in future team projects. For example, web-based e-mail messages with attachments were either completely lost or arrived without attachments. Undeliverable and other unforeseen technical problems were the major concern to the team. Those difficulties were gradually overcome and students learned to effectively deal with them.

III. Outcomes

Outcome assessment is now one of the buzzwords used in CE2000 [7, 8]. Interestingly enough, this project readily lends itself to outcome assessment. Marks and grades are not the outcome, but rather a working program that was created through teamwork using the Internet meaningfully. The students needed to build on what has been learned in two courses and carry out research when needed. What makes this undertaking essentially different from the project that is typically required before graduation is that it has smaller scale, less time consuming, and if deficiencies were discovered there would have been still time to correct them since the students have three more terms before graduation.

Students used Borland C++ Builder to code a program that helps in the design and analysis of a second-order multiple-feedback low-pass, high-pass, and band-pass filters. The program has a graphical user interface, shown in Fig. 1 through which the user has choices to:

- Compute the values of the resistors and capacitors given the gain, damping factor, and natural frequency.
- Compute the values of the gain, damping factor, and the natural frequency given the component values.
- Plot the magnitude frequency response.
- Provide a brief tutorial for each filter type.

After it was completed the program was made available to all students enrolled in the Analog Signal Processing course. Below are some of their comments.

- Very easy to use
- Very useful.
- Excellent tool to check and compare results to hand calculation.
- Need to add extra modules such as printing, saving, and help.

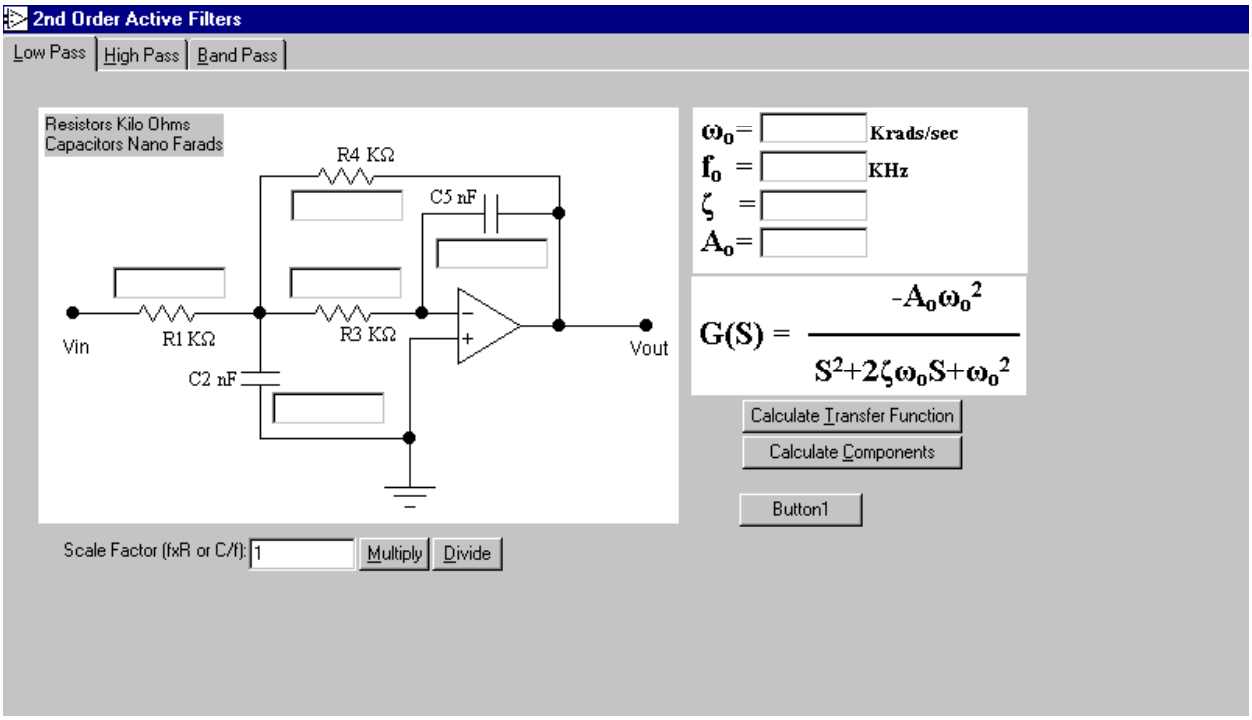

Fig. 1 The user interface of the module

IV. Concluding Remarks

This paper described an approach that was introduced to acquaint students with virtual teams. It resulted in a useful program that was used by other students. It is hoped that the outcome will motivate students in the coming terms to contribute to such activities.

It is hoped that in the future the scope of the project will be widened not only to include more students from the two campuses but also to get some of our audience interested in exploring the possibility joining in the project. Other programming platforms, such as Java will be of interest in the future. Minimum interventions from instructors is another goal. It is being contemplated currently to have a smaller project, practically a laboratory experiment to be conducted by a virtual team for marks at earlier terms.
A copy of the program is available for any member of the audience.

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BIOGRAPHICAL INFORMATION

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