CONTINUING ENGINEERING EDUCATION IN THE PHILIPPINES*

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Abstract: *The need for engineers to undergo Continuing Engineering Education (CEE) in the Philippines is urgent. This is because there is a rapid change in the knowledge and engineer must now possess. The CEE Program describes how it is undertaken to help Civil Engineering Teachers in the past. An innovative teaching method is now being introduced to any engineering teachers in order to undertake a paradigm change in his/her method of teaching. In doing this, it is envisioned that a better teaching-learning cycle will take place in the classroom. This will be undertaken for selected teachers of Engineering Schools in the Philippines*

▸ INTRODUCTION

The Philippine educational system largely uses the chalk-and blackboard method of teaching. This method is used in all levels, even in most schools of Engineering, since the beginning and, unless changes are made now, will still be used in the unforeseeable future. The outcome of such a method is there for everyone to see. While it served its purposes, modern times make far more specific demands than such antiquated methods can take to deliver.

In majority of engineering schools an engineering teacher is hired to teach in the College of Engineering. More often than not, the new teacher has had very little, if any, industrial experience to be able to relate the subject matter he will teach to the practice of the Engineering profession, at the same time lacking the educational training and expertise to teach. A paradigm change the teacher uses to teach will remedy this problem.

The paradigm change is a need to train teachers in educational methods using the latest innovative methods. This can be done using the Continuing Engineering Education Program. However very little work is done on this area in the Philippines today.

When a school undertakes a Continuing Engineering Education Program, questions like, "Why do you do it?" are asked. One answer is so that the teachers of other schools may avail of CEEP to help improve them. Another reason is that CPU, as one of the Centers of Development considers it an obligation to assist other schools in their development, particularly in CEEP. The most important answer could also be that a school can comfortably undertake CEEP without worrying about competing with CPU. And lastly, if CPU does not undertake CEEP to assist other schools, who else will do it?

CEE Work Undertaken

During the past fifteen years the CPU College of Engineering has undertaken a very intensive Continuing Engineering Education Program. The CEEP tried to answer the need for civil engineering teachers all over the Philippines to be trained to undertake the correct laboratory exercises. The results of the CEEP have been more than what was envisioned. A total of 45 seminar workshops has been undertaken with more than 846 teachers coming from 115 civil engineering schools attending the seminar workshops.

The CEEP has done more than what was expected when it was first started. One very important aspect of these workshops was the introduction to the participant how to use locally fabricated equipment. In doing this schools will able to fabricate their own equipment, at the same time reduce the cost of acquiring the laboratory equipment they need.

In the late 1980s the college of engineering started undertaking innovative teaching methods. The first method tried out was using the Open Laboratory. This was followed by several methods such as large lecture classes and then small discussion classes. The first year design project then followed together with the use of Cooperative Learning. The project based and problem-based teachings were also introduced.

The latest innovative method is the preparation of an ABET outcome-based syllabi. This is a unique method of preparing a syllabi since it requires the use of an assessment method to determine what the results will be. Another innovative method is for the faculty to prepare a self-development plan in order to determine the future of the faculty member. The instrument used is known as the faculty self-development plan and each faculty member in the College of Engineering is required to present a five-year plan at the end of the semester.

CEE Innovative Teaching Method

In 1994 after attending an American Society for

* *Presented at the International Conference on Continuing Engineering Education Toronto Canada 2001*

Engineering Education Conference in Washington DC the undersigned realized that a lot of innovative methods was available for engineering teachers to use in the US also be possible in the Philippines. After a short period of trying out these innovative methods it was decided to try these out in a more intensive form. At the same time the undersigned attended more ASEE conferences and obtained more additional references.

Several references were also obtained by the undersigned from several authors of the papers on various innovative methods. References presented in several conferences on engineering education in Southeast Asia were also obtained. In addition several references were obtained through the www and also books on engineering education.

The undersigned presented several papers based on the results of using the innovative method and additional references. This paper was presented in several conferences locally and abroad. A year ago it was decided by the College of Engineering of Central Philippine University that the use of innovative teaching method be made part of its continuing engineering education program.

In order to do this funds were needed to undertake the CEEP. A funding agency was selected and sent the proposal. A grant was given by one agency to undertake the CEEP program to introduce innovative methods to improve teaching for new teachers of engineering schools. This funding agency is the United Board for Christian Higher Education. Another funding source was the award to the College of Engineering of CPU given by the government agency responsible for higher level education, known as the Commission on Higher Education.

A team of five teachers was then selected. Four of the team members came from the College of Engineering. Almost all of them were experienced teachers and had used some of the innovative programs in one time or another. In order to relate the training program to educational principles a consultant from the College of Education of CPU was included in the team. This teacher was also deeply involved in using innovative methods in teaching.

The coverage of the training program was then determined. In order to do this several references on teaching new teachers on how to teach was evaluated. The first reference used was the book on "Teaching Tips"[1] by MacKechie which is a very popular reference book for new teachers. The next reference was the manual "Effective Teaching A Workshop"[2] by Dr. Richard Felder and Dr. Rebecca Brent. The book "Teaching Engineering"[3] by Wankat and Oreoviez was also selected as a reference together with a paper on "A Course on Teaching Engineering"[4] by Susan Montgomery and "Teaching Teachers To Teach Engineering"[5] by Jerry Samples. The final reference used was "Teaching Workshop"[6] by Susan Ambrose. The manual on mentoring the mentors was also used as a reference for mentoring program.

The team then evaluated all the references and agreed to the coverage of the training program. The team agreed that the training program would be known as "Teaching Teachers To Teach" or T 4. The title was based on the title of the training program used in West Point for new teachers. The team members were then assigned specific areas to cover. The first was on the area of introduction to innovative teaching, how students learn and what should teachers teach. The second team member covered cooperative learning. The third team member covered the area of the engineering student. The fourth team member's area was on subject preparation. The last team member's area was on values and assessment.

The team then ran this training program in a seminar for teachers of Central Philippine University in May 2000 with around 28 participants from different colleges attending. Although the original idea was to use this only for engineering teachers who were new, it was decided to use this to include new teachers from any college. The results of this seminar-workshop were then evaluated.

In October 2000 the team went to another school to undertake a similar seminar as part of its CEEP. The participants were more than 60 and came from 8 schools and some problems were encountered. The team also evaluated the results to find out what problems were encountered. The results were then compared to the results of the first seminar-workshop held at CPU.

Among the deficiencies listed was the lack of base line data to determine the performance of teachers who participated in the seminar-workshop. This data was needed for comparison to the evaluation of the teacher's performance at the end of the year. The second problem encountered was the lack of interest among the participants at the end of the seminar to try out the innovative methods used in the lecture. The third problem was the need to use this training program only for new teachers.

In order to rectify this problem a second training program was scheduled in late December. Among the additional provisions made were the assessment made by the students under each participant to gauge

the teacher's performance. The teacher was also asked to assess himself based on the coverage of the subject matter using another instrument prepared for this purpose.

In order to maximize the impact of the training program it was decided that all participants to the seminar-workshop would be new teachers. The reason for this decision was it was felt that new teachers should start their teaching process correctly rather than allow for them to learn from experience, which would take a long time.

The workshop on Teaching Teachers To Teach was then held and each participant was required to attend all other sessions and a four-day workshop. In order to motivate the participants to really understand what was being presented a lot of group dynamics as well as questions and answers were used in the workshop. The coverage of the workshops was decided a few months ago.

In order to assess the performance of workshop speakers an evaluation instrument was filled up by each of the participant at the end of the each session. This evaluation will be used when future seminar workshops will be undertaken. In areas in which the performance of the team members was not satisfactory, provisions will be made for improvement.

In order to determine if the participants will now apply what they have learned in attending the T 4 seminar-workshop another process will be used. This is known as the mentoring the mentors. The team will divide the total number of participants into groups of 4-5 participants. One team member will supervise the performance of the 4-5 participants for a period of two and a half months. The supervision that will be undertaken will consist a group meeting every two weeks to thresh out problems the new teachers are encountering while they teach. These meetings will be scheduled during the noon break and will be a lunch meeting in order to allow all participants to attend the meeting and not miss their classes. In the month of January as well as February, two additional innovative methods will be explained which well reinforce whatever knowledge the new teachers have been able to learn. A feedback with all the team members of workshop participants will follow after the snap workshop. The purpose of this process is for the participants to present their problems and what would be possible solutions.

Another evaluation of the teachers' performance will be undertaken before the end of the semester. The evaluation will be done on the same class that the original evaluation was undertaken. At the end of the semester the team will evaluate the results to find out if the new faculty really improved their teaching process. The participants will also be requested to evaluate the entire program to find out what was its impact on their teaching. All in all therefore the results will be based on the teachers assessment form before and after the teacher had attend the teaching session as well as the mentoring the mentor program. Additional results will be the assessment of the teacher on the coverage of his/her syllabi and finally a brief report by the teacher of his understanding if he felt a self-satisfactory and improvement in undergoing the training program.

A final report will then be prepared and presented to the funding agency. At the same time however additional funds will be so that future seminar-workshop on T 4 can be undertaken as well as mentoring the mentors based on their experiences of running the workshop several tons.

▸ CONCLUSION

It was the belief of the team that the T4 program together with its mentoring the mentor could really help new teachers improve their teaching process. If these programs are replicated in other schools more teachers who did not have any experience would be able to easily learn the tricks. The Continuing Engineering Education program, if successful will solve some of the problems that were given in the first part of this paper. At the same time with a better teaching efficiency perhaps students will learn more from their teachers. In the end we can say it was well worth the effort of doing this continuing education program.

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