UTILIZATION OF PRE AND POST ASSESSMENT TESTING FOR REINFORCING LEARNING PROCESSING IN ECET COURSES

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Abstract *– One of the elements of a well-written syllabus is to list the goals or competencies that will be taught. This list, while useful, often does not have an impact on the students, and is usually not reviewed during or after the term. In two ECET (Electrical and Computer Engineering Technology) courses, the use of pre-test and post-tests were applied to semester based technical course. These pre-tests were reinforced with handing out a syllabus that listed those competencies. A version of the post training tests was given to the students during the semester and at the end of the semester. Test scores for each student were compared for all three tests, which helped both the instructor and student understand the effectiveness of the course. An assessment of this methodology was then performed with the students, and will be discussed in this paper.*

Index Terms – Competencies, Engineering Technology, Pre-Assessment.

INTRODUCTION

One of the elements of a well written syllabus is to list the goals or competencies that will be taught. This list, while useful, often does not have an impact on the students, and is usually not reviewed during or after the term. Also, with the exception of the final exam, there is no way to understand, by either the students or the instructor, whether these competencies were achieved.

In computer application training, it is becoming increasingly important to give both pre-assessment and post training tests [1-3]. The pre-assessment test serves two functions –to help the instructor understand what level of expertise the students have coming into the course and to provide students with an understanding of what competencies they should learn during the course. The post training tests will then demonstrate to both the studentsand the instructor whether these competencies were learned. However, most of these courses are just one or two days, so the post-assessment test is given immediately after the material has been presented. This would not be the case for a semester based college course.

In two ECET (Electrical and Computer Engineering Technology) lab courses at New Jersey Institute of Technology , pre-test were developed to demonstrate to the students what competencies were to be gained during the course. This was reinforced with handing out a syllabus that listed those competencies. Similar tests were given during the semester and at the end of the term. Test scores for each student were compared for all three tests, to demonstrate what was learned. An assessment of this methodology was then performed, and will be discussed in this paper.

CONCEPT OF ASSESSMENT TEST

Among the courses new electrical and comp uter engineering technology (ECET) students at New Jersey Institute of Technology take are two introductory courses, EET 303 (Circuit Measurements) and EET 310 (Microprocessors I) which are given to. NJIT is the upper division of the engineering technolo gy program, and many of the students enter the school having spent a number of years working after graduating community college. These students should have some of the background for these two courses, based on courses taken in the first two years at a community college. However, since many of these students have been in the workforce for several years, it became apparent to the author after teaching these courses for the first time that students lacked many of the fundamental concepts.

This was one of the primary motives for creating these assessment tests. The other motive was based on student's understanding of the syllabus. The syllabus that was handed out to students in these courses listed about 6-7 competencies, which demonstrated the objectives of the course. However, it was felt that there might be a better method to demonstrate what competencies will be learned.

Therefore, an assessment test was developed by the author to accomplish both these goals. The goals of these tests were:

- To test bas ic competencies of the students entereing these courses, based on coursework that should have been completed during the first two years at a community college.
- Provide an array of questions that would cover the basic competencies listed in the syllabus.
- Limit the test to 20 -30 minutes.

Students were told that these tests would be graded, but these scores would not be part of any final grade. The expectation for the first assessment test was that the students would do average on the exam, since some of the material was based on coursework that should have been covered during the first two years. The grades for the first assessment test would show the students what could be accomplished during the term.

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The expectation for the mid-semester assessment test was to give the students a perspective on what they have learned, as well as what material remains. The final assessment was oriented to provide the students with an understanding as to what was covered in the course, as well as what are the deficiencies that they need to review prior to taking a final exam. All three assessment tests took approximately 20-30 minutes, and had slightly different questions, but which covered similar topics.

For both courses, the students kept the tests after they were graded. In the next lecture, after the first assessment test was graded, the author reviewed the syllabus again, and related the questions that were on the test to specific areas in the syllabus.

POTENTIAL BENEFITS OF ASSESSMENT TEST

There were several benefits that could result from these assessment tests. The first benefit would be a better visualization of the course expectation. While the syllabus was very detailed as to the course assignments and objectives, these assessment tests provides an example based method to offer students an understanding of the expectations of the course.

The second benefit is that it provides an understanding to the instructor of any deficiences individual students might have going into the course. After the first time these tests were given, students received additional homework assignments that were targeted to provide additional insight in areas they should have known from prior courses. Without this knowledge, instructors could progress into a course assuming that students understand information that should have been covered in a prerequisite course.

A third benefit is that this type of test was non-threatening, since the grade did not count. A number of students each term exhibit a syndrome the author calls 'test-freeze". Basically, these students "freeze" up during a test, and forget all the information. By having to take three tests during the semester that did not count, some of these students might be helped.

ASSESSMENT TEST – ECET 303

The assessment test for EET 303 covered the following areas:

- Definition of ohm's law and Kirchoff's law –the author found that some students, coming from the community colleges, did not remember or know how to use some of the basic circuit theorems. The lack of knowledge for this subject, like others listed below, might also be due to the fact that many of our students have been in the workforce after graduating with an associates degree. In most of their jobs, they did not use the basic concepts that were taught to them in the first two years, and thus forgot them. Based on the results of the first assessment tests, a study guide on this subject, along with homework examples, were given to the students.
- Basic elements of a Bode plot – many students did not understand the concept of frequency analysis, although part of the questions was also oriented to show what they will learn.
- Current/voltage relationships for a capacitor and inductor
- Thevenin equivalent of a circuit – while the course content included a detailed description, the intent of this question was to see if the students had a basic understanding of a Thevenin circuit. This question was divided into two parts. The first part dealt with a simple circuit, while the second part dealt with a more complex circuit and a dependent source. The second part of this question was oriented to show what will be covered, and there was no expectation by the instructor that the students would be able to answer the second part.
- Gain of a specific op amp circuit.

ASSESSMENT TEST – ECET 310

The assessment test for the microprocessor course involved brief questions from each chapter in the texbook. Students should have known some of the material in these assessment tests, since they were expected to take a similar course during their first two years.

The assessment test for EET 303 covered the following areas:

- Number conversion – being able to convert between binary, decimal and hex.
- Simple coding – the concept here was not to test the students knowledge of assembly language, which was the language taught in this class. Rather, examples were given in which the students needed to demonstrate basic programming skills, such as use of looping, conditional statements, and input/output. Students were asked to write the "code" as algorithms, and therefore in standard language. Each step was to be defined. In this manner, the author was able to assess how well students understood the basic concepts of programming, before the author got into the specifics of assembly language.
- Being able to differentiation between calls and interrupts.
- Basic structure of a microprocessor.
- What is missing in a program – this question is one of the types of questions the author asks during a test, and therefore would prepare the students to start thinking about this concept.
- Significance of basic terms.

Results and Conclusion

The average for all students for the first assessment test in ECET 303 was 50%, while the average for all students for the first assessment test in ECET 310 was 46%. The average test scores for the midsemester assessment were 68% and 62% respectively. The test scores for the final assessement, which was given one week prior to the final, were 85% and 78% respectively. These grades were slightly higher than the average of the final exams in those courses

In discussion with the students, most of the students liked the concept of a pre-assessment test to show what type of material will be covered during the term. They found that the final test was a good review for the final exam, and showed them if there were any weaknesses that needed to be addressed before the final exam. They were able to verbalize, when asked, what they had learned during the course.

In terms of post-assessment for the instructor, the tests provides a better understanding, prior to the final, where there are weaknesses that need to be reviewed. This test was given one meeting prior to the last class, so that a final review could be "customized" to the material that was still unclear. The mid-semester assessament test was useful by allowing the instructor to visualize what areas were still a problem, resulting in a mid-semester review.

The choice of questions that should be covered in this brief exam varied with each course, and included both questions on material that an instructor assumes the student should have known upon entering the course, as well as simple examples of materials that were to be covered during the course. Obviously, the "grade" that the students obtain on this test depend on the proportion of material chosen that an instructor feels students should not know prior to the course. Therefore, it is impossible to determine an target grade for the first assessment test. However, if the questions on the subsequent two tests are not different in terms of difficulty or content, then there should be a significant improvement in each test. If there is no improvement for the mid-semester test, a mid-semester review is definitely warranted.

The interim test differed in the type of examples, but the basic content of material was the same as the pre-assessment test. The author chose to have the post-assessment test, or final test, the same as the pre-assessment test so that a comparison could be made, and the assumptions was that the students would not remember what questions were on the pre-assessment test. The second time the author used these assessement tests, the post-assessment test was slightly different that the pre-assessement test. The improvement was significant from pre to post-assessment tests whether the post-assessment tests were the same or different.

However, the one drawback with this type of testing is the time it takes – approximately 20-30 minutes three times a semester. Based on the feedback from students, this would be a minimum concern. The author will be looking into the possibility of offering these assessment tests on-line, so that time will not be taken away from class discussion.

The author will be expanding this pre and post-assessment test concept to other ECET courses.

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