Assessment of Electronics and Communication Education Curriculum

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Abstract: - Continuously improvement of education has become a major goal for schools and assessment has been important part for this improvement process. This paper describes the assessment process of electronics and communication education curriculum of Marmara University in Istanbul. Since its establishment in 1975, electronics and communication education curriculum of Electronics and Computer Education Department had several major reviews by adding and/or changing course contents, credits and student workload. Effects of those changes have not been assessed yet. It is important for their progress; the institutions need to determine how well their graduates are doing, what the strengths and weaknesses of their curriculum are. Feedback is needed for both better curriculum design and teaching/learning methods. With this article we present process of the assessment we realized to reflect the results improving the Curriculum of Electronics and Communication Program of Department.

Key-Words: - Assessment, Curriculum, Electronics and Communication, Statistical analysis

1 Introduction

Technology education has important place in every country's industrial grow and curriculum of this type education is quite complex. In particular, electronics and telecommunication education, due to rapid advance in electronics technology and short life times of products, need a special attention. To work and survive in electronics related work places whether in industry or in schools, graduates of these programs must continue to learn in the rest of their life. Besides learning fundamental knowledge, students require to be prepared with applicable skills of their subjects. To be able work in today's competitive world, as members of multidisciplinary teams, to work with complex system and services, and to continue to learn after graduation they require learning skills and attitudes [1,2]. Curriculum should cover new teaching/learning methods to realize all of those skills [3]. New paradigms in education impose us to teachers, using modern techniques and approaches in teaching [4]. Main aim of the electronics and telecommunication education institutions should be therefore continuously evaluate and improve their curriculum and to do so assessment is becoming integral part of curriculum.

Education should be considered a closed system in which students are raw materials to be processed, educational environment and its settings and activities are the process, and the graduates are the products of the system [5]. To maintain this system working continuously and perfectly, a feedback from output is to be used to redesign the curriculum and to improve its activities and settings [6]. According to Olds, Moskal and Miller, "High-quality assessments can provide educators with information they can use to move the field forward" [7].

Electronics and Communication Education Program of Electronics and Computer Education Department of Marmara University have a special mission. This mission is to produce best technical teachers and technologist to work both in secondary level technical schools and in industry. To fulfill this mission the curriculum has to be set differently to similar post-secondary institutions such as engineering schools.

2 Assessment Plan

To form the framework for the assessment process, a team was formed and members were constituted from both electronics and communication education and education sciences departments. In this study the strategy of assessment process within team members were discussed. Through the discussions,

absence of clearly defined and updated objectives of curriculum was one big problem. To overcome this problem we decided a literature review in related fields. At the conclusions of literature review, we agreed on the followings:

- To update and redefine mission and vision of the department and program.
- To define department, program and course level objectives
- To define department, program and course level outcomes
- To determine methods and tool being used in assessment process.
- To develop and implement a pilot study prior to assessment process.

Team agreed that, graduates' and students' evaluations toward to the electronics and communication curriculum were seen in precedence valuable and restricted with them for this first part assessment process. During the study, another problem occurred on addresses of graduates, which were necessary to communicate. We obtained addresses of teachers who were graduated from the department of Electronics and Communication Education Program of Electronics and Computer Education Department of Marmara University in different years from Ministry of Education and we formed an e-group to gather together the graduates whose work non-teaching jobs.

3 Purpose

We determined the goals of this study to find the answers to the followings questions from the viewpoints of the graduates:

- Program evaluations of graduates in general and their satisfaction rate.
- Graduates' evaluations of academic advising service of department.
- Types of works graduates work.
- Graduates' evaluations for their adaptation of school to work transition.
- The rate of necessities of the courses and laboratories for their jobs.
- Graduates' evaluations of each courses and laboratories they took.
- Graduates' evaluations of each course they took according to the level of necessities for their works.
- Courses needed by graduates for their jobs, which were not offered to them when they were students.
- To evaluate program improvement suggestions of graduates.
- To evaluate post-school experiences of the graduates.

4 Assessment Instruments and Tools

For this assessment process we realized, survey questionnaires and face-to-face interview techniques are realized. We evaluated program outcomes by applying two different surveys, to the students when they were just graduated in July of 2002 from the program and to the graduates of the program prior to 1988. Other source of data in this study being used was interviews with students in sophomore classes. Survey questionnaires have been applied face-to-face, by post and web based to the graduates of the program and data were obtained from 221 graduates. 128 graduates answered the survey in peer, 136 forms of survey were send to the addresses of graduates by post and 39 of them were returned and 44 of 211 graduates were answered the survey via web. Face-to-face interviews were made with 30 sophomore students. SPSS (Statistical Package for Social Sciences) is used in order to process the gathered data. The surveys included both closed-end and open-end questions. For the closed-end questions, Likert type scale is preferred among the others, Thurstone type and Osgood type etc. While preparing the Thurstone type scale it is required to apply for views of experts and this makes this type scale difficult to prepare. The other reason on why likert type scale consists of five options such as "I strongly agree", "I agree", "I am undecided", "I disagree" and " I strongly disagree" was preferred to Thurstone type scale consists of two options is that the graded options of Likert type scale give more sensitive results [8]. Tough it is thought that Osgood type scale gives more reliable results as it has more options. We preferred to prepare Likert type scale as; Osgood type requires 8-15 titles each consists of 10-20 clauses [9].

The parts of the Graduates' Questionnaire were:

- Personal facts: 8 item closed-end and 4 item open-end form
- Course and laboratory evaluations: 31 items with three categories in closed-end form.
- Skills and attitudes evaluations: 20 items in closed form.
- Part of satisfactions/dissatisfactions of services and education, suggestions and "last words to say": 6 items in open-end form.

Exit survey was very similar, except job related evaluation questions were not included. Since we could not reach to all of the graduates, surveys were sent only to the graduate addresses obtained.

5 Assessment Results

In this study, statistical analysis was performed for the data on the applied survey forms by the SPSS (Statistical Package for Social Sciences). We obtained the characteristics of sample such as graduation years, work conditions, further education information and similar other information of graduates in percentages and sketched in pie charts. In Figure 1 graduation years of the sample is shown as an example. As it's seen from the Figure 1, the percentages of graduates of the sample distribute as 6% from prior 1987 years, 12% from 1987-1991 period, 24% from 1992-1996 period, %29 from 1997-2001 period and 29% from 2002 academic year.

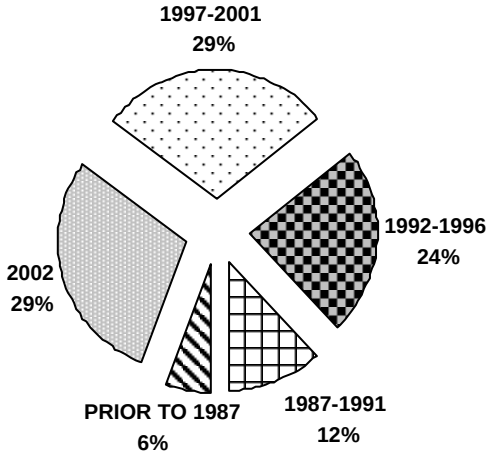

Fig.1 Graduation Years of Sample

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Later, we obtained descriptive statistics, mean and standard deviations of parameters of sample and sketched histograms with fitted normal curves. After calculating descriptive statistics and histograms calculated for all parameters and a sample histogram, mathematics courses necessity for graduates' works is shown in Figure 2.

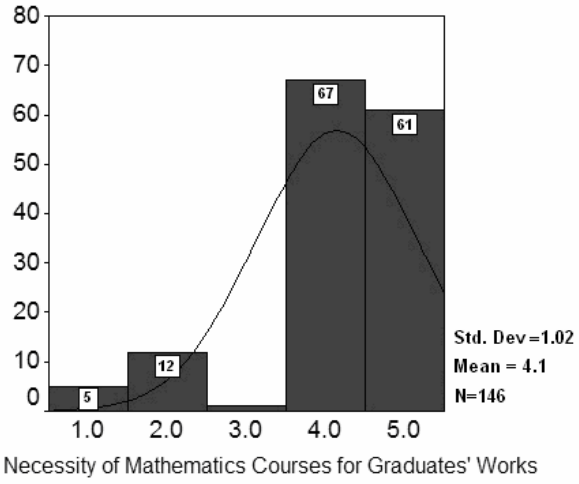

Fig.2 Basic statistics and histogram for mathematics necessity for graduates' works

As it's seen from the Figure 2 according to 146 respondents, with mean 4.1 and standard deviation 1,02 (1 corresponds not necessary at all, 2 corresponds to unnecessary, 3 corresponds to undecided, 4 corresponds to the necessary and 5 corresponds to the fairly necessary in scale of this part), mathematics courses are required for the graduates for their works.

To compare the equality of variances and equality of means of independent variables, we applied sampling distributions; for equality variances of two independent parameters Levene's tests and for the equality of means of those parameters, t-tests at the significance level of 0.05. An example of those tests is shown Table 1, where the respondents graduated between 1992-1996 and between 1997-2002 have evaluated mathematics course, is compared for the equality of means and variances. It's seen from Table 2, graduates from 1992-1996 and from 1997-2001 graduations periods, evaluated mathematics courses and results that the means are equal but the variances are differently within the 95% confidence interval were obtained. Sample groups were compared for all variables and the results were discussed. However, answers of open-end question and results of the interviews were categorized and listed according to their frequencies.

Table 1 Group Statistics for Mathematics Course Evaluation for graduation periods

Group Statistics	GRADUATION PERIOD	N	Mean	Std. Deviation	Std. Error Mean
MATHEMATICS COURSE EVALUATION	1997-2002	55	3.89	.975	.131
	1992-1996	49	3.88	.754	.108

Table 2 Analysis Results for Equality of Means and Variances for Mathematics Course Evaluations

Independent Samples Test		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
MATHEMATICS COURSE EVALUATION	Equal variances assumed	.623	.432	.077	102	.938	.01	.172	-.329	.355
	Equal variances not assumed			.079	100.077	.938	.01	.170	-.324	.351

6 Conclusion

Obtained results were discussed with the members of team. Some of the most remarkable outcomes from this study are listed below.

- By delivering course material, new methods for teaching and learning should be utilized.
- Study load of students need to be decreased.
- Laboratories facilities need to be improved
- Problem and project based approaches to teaching and learning need to be considered.
- Modern communication courses need to be added in to curriculum.
- Need to tune the contents of the courses to the work life.
- Clearly defined goals, missions and visions of program need to rewritten.

Then results were shared with the teaching staff in the department.

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