

COOPERATIVE EDUCATION IN TURKEY: A CASE STUDY AT TOBB ETU

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ABSTRACT

TOBB Economics and Technology University (TOBB ETU) was founded on July 2003 by TOBB (Union of Chambers and Commodity Exchanges of Turkey, in Turkish) as a non-profit foundation university at Ankara, Turkey. TOBB ETU was founded with a keen interest to educate a new generation of students who will become the leaders of community with their spirit of entrepreneurship and are well prepared with a balanced theoretical knowledge and practical experience. In a short period of time, TOBB ETU has already become a leading university in Turkey.

TOBB ETU is the only university in Turkey applying cooperative education (coop) model. University life is based on a tri-semester system and alternative cycles of academic and practical learning for the sophomore, junior and senior level students. The model works by a voluntary paid employment of each student by the employers during their practical terms commensurate with the Turkish labor law. The coop model has been going on successfully, and with growing support and participation of industrial and business institutions ever since it had started in 2005. Cooperation protocols with more than 500 leading companies in Turkey had been already signed which had provided more than 1000 workplaces. Students benefit immensely from the coop education. Prior to graduating from the university, they have the opportunity to start working in fields relating to their major and preparing themselves for the business world. They gain experience in different work settings, have the opportunity to test themselves in various subjects, and personally select the job that suits them the best.

1. INTRODUCTION

Cooperative education is a structured method of combining academic education with practical work experience [1]. Coop education is nothing new for the universities in the western countries. It is more than 100 years old and applied for the first time by Herman Schneider, dean of engineering, in University of Cincinnati on 1906 [2, 3]. Today, there are more than 1000 coop academic institutions in more than 44 countries all over the world [4-10].

Coop education at university level in Turkey was first tried by Middle East Technical University (METU) in 1997 with about 20 engineering students. However, the program was more like unpaid practical training, and delayed graduation of the students. It was not successful, and abandoned after a year. The first real cooperative education model in Turkey is operated by TOBB University of Economics and Technology (TOBB ETU). Coop model is especially attractive for TOBB ETU which aims to give its students balanced theoretical knowledge and

work experience, and a spirit of entrepreneurship. The coop model has been going on successfully, and with growing support and participation of industrial and business institutions ever since it started in 2005. The aim of this paper is to lay out the motives, structure and operation principles of the coop model of TOBB ETU, and to evaluate the results of the first three years of its application.

2. TOBB ETU

TOBB ETU was founded in 2003 by TOBB (Union of Chambers and Commodity Exchanges of Turkey, in Turkish) as a not for profit foundation university in Ankara, Turkey. TOBB is the biggest NGO in Turkey with more than 1,200,000 member companies. TOBB ETU was founded with a keen interest to educate a new generation of students who will become the leaders of community with their spirit of entrepreneurship. The students are aimed to have strong theoretical knowledge, an awareness of the latest technologies in their field, and the competence to integrate their theoretical knowledge with applications of their professions.

Admission of first students to TOBB ETU was in the academic year of 2004-2005. At present, the university has 4 colleges, 12 departments and approximately 1800 students. The first graduates were given at the end of summer 2008 term. Some basic data about the University as of October 2008 are summarized below.

Colleges and Departments:

- College of Economics and Administrative Sciences
 - Department of Business Administration
 - Department of Economics
 - Department of International Relations
- College of Engineering
 - Department of Computer Engineering
 - Department of Electrical and Electronics Engineering
 - Department of Industrial Engineering
 - Department of Mechanical Engineering
- College of Fine Arts
 - Department of Art and Design
- College of Sciences and Letters
 - Department of History
 - Department of Mathematics
 - Department of Turkish Language and Literature
- Graduate Schools
 - Graduate School of Natural and Applied Sciences
 - Graduate School of Social Sciences
- Department of Foreign Languages

Academic Staff:

Total Number of Academic Staff	: 145
Number of Students per Academic Staff	: 12

Student Body:

Total Number of Students : 1800
 Undergraduate : 1720
 Graduate : 80

Percent of International Students : 2%
 Percent of Scholarship Holders : 51%
 (Scholarships include tuition fees, monthly stipends and dormitory expenses.)
 Non-investment Expenditures per Student : 10177 USD

Some of the best students of Turkey are admitted to TOBB ETU academic programs. Rankings of the students admitted in the 1,600,000 students which took the Centralized University Entrance Exam in 2008 are as follows:

From the first 10 : 1 student
 From the first 100 : 15 students
 From the first 1000 : 46 students
 From the first 2000 : 60 students
 From the first 3000 : 81 students
 From the first 5000 : 121 students

Ranking of the departments:

Ranking of the departments as compared to the corresponding departments of the 132 Turkish universities are as in Table 1.

Table 1. Rankings of the TOBB ETU departments.

College and Department	2005	2006	2007	2008
College of Engineering				
Mechanical Engineering	4	4	4	4
Computer Engineering	7	7	5	4
Electrical and Electronics Engineering	7	6	6	4
Industrial Engineering	7	5	5	4
College of Science and Literature				
Turkish Language and Literature	4	1	1	1
History	8	7	4	4
Mathematics	7	7	5	4
College of Economics and Administrative Sciences				
Economics	8	5	4	1
Business Administration	7	4	5	1
International Relations	8	6	6	5

Research and Publications:

SCI, SSCI and AHCI publications per faculty member:

2005 : 1.30 (Average for Turkey: 0.57)

2006 : 1.21 (Average for Turkey: 0.52)

2007 (not declared yet by Turkish Higher Education Council, but unofficially number one again) [11]



Figure 1. Main building of TOBB University of Economics and Technology

Campus and Facilities:

- TOBB ETU has a campus in the city center of Ankara (Figure 1).
- Total land area : 194,000 m²
- Total floor area : 60,000 m²
- Ultimate expected student capacity : 3000
- 57 multimedia supported classrooms.
- 1 intelligent classroom.
- 24 modern teaching and research laboratories.
- A library with 50 000 resources, and 12 000 electronic journals currently.
- Notebook computers are provided to all registered undergraduate and graduate students free of charge at the time of their registration.
- Wireless internet access throughout the campus area.
- Convention Center with 9 conference halls of capacities up to 3000 people.
- 48 Student clubs and societies.
- Foreign Languages Center.
- Research centers.
- Research Institute for Economic Policies.
- Sports center and Olympic swimming pool.
- Facilities for the disabled.
- Medical Center.
- Restaurants and cafes.
- Media services center.

Special Characteristics of Education at TOBB ETU:

- Cooperative education model is used.
- High proficiency in the English language. One year of prep school, and English courses for the following four years. Proficiency exams are given by ETS (TOEFL). An IBT score of 100 is aimed. Minimum IBT score for graduation is 94.

- The teaching language is Turkish as opposed to other Turkish universities with English prep school.
- A second foreign language of students' choice for six semesters (intermediate level is aimed).
- Balanced professional and social courses in the curricula.
- Special emphasis on entrepreneurship, team work and life-long learning.
- Extensive use of internet and electronic data banks to reach information, which is one of the reasons why notebook computers are given to all students and wireless network, is made available throughout the campus.
- Special importance is given to laboratories of technical courses. Laboratories appear as separate courses in the curricula so that laboratory studies are not reduced in favor of theoretical courseware. For example: MAK 302 Fluid Mechanics, MAK 302L Fluid Mechanics Laboratory.
- A scholarship system which awards success.
- Highly qualified faculty. University reverses the brain drain by employing bright and young Ph.D. holders from prominent western universities.
- Student centered approach.

3. COOPERATIVE EDUCATION AT TOBB ETU

3.1. The motive of the TOBB ETU cooperative education program

The Turkish educational system has four stages as depicted in Figure 2, which are pre-school education, primary education, secondary education and higher education. Primary education, which is 8 years, is compulsory. One can follow either one of the two tracks at the secondary education level, namely the tracks of general high schools or the vocational and technical high schools.

Higher education institutions include universities and other institutions of higher education with programs of at least two years. Admission to higher education is through a nation-wide Student Selection Examination which is held once a year. The placement of candidates to programs is made also by a centralized process according to the scores they get from Student Selection Examination. The structure of the tracks that lead students from secondary education to higher education is shown in Figure 2. There are basically two tracks which lead to either vocational/technical schools of higher education, or to the undergraduate programs in universities.

The vocational/technical schools of higher education are more technical skill and competency oriented whereas undergraduate programs of universities generally provide technical knowledge and analytical skills (Figure 3). Undergraduate programs in technical fields usually have two 4-week periods of summer practical training to enable students to apply their theoretical knowledge to practice. However, this type of practical training has turned out to be totally unsuccessful because the period is too short, and it is not taken seriously neither by the companies, nor the students. As a result, graduates of universities usually must have 6 to 12 months of on-the-job training before they can be of any use to the company they work for.

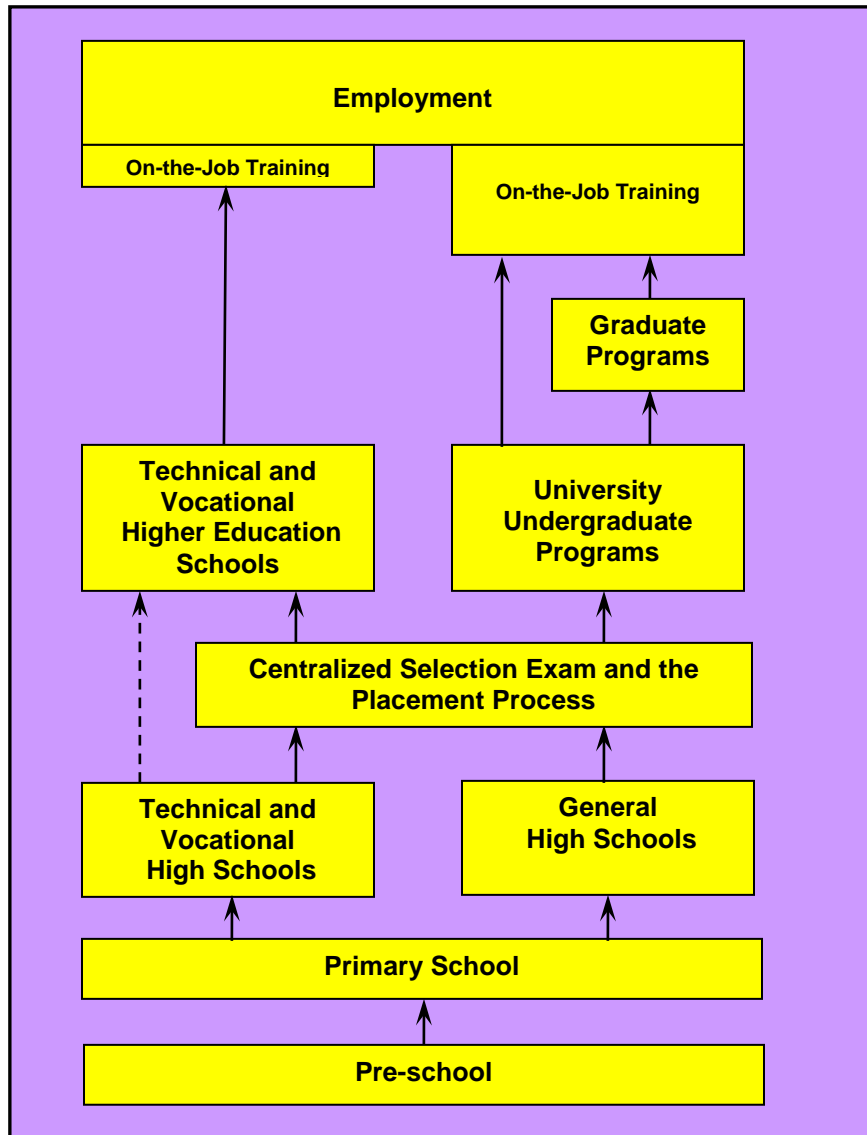


Figure 2. The Turkish education system.

Some of the deficiencies of university graduates as observed by the employing companies are as follows:

- Graduates cannot put their theoretical knowledge to use in their jobs.
- They lack self-confidence.
- They are not oriented in their professions. They do not know in which areas of their profession they want to specialize.
- They do not know how companies operate, and they have no business notion.
- They are inexperienced in human and business relationships.
- They have insufficient communication skills.

Cooperative education at TOBB ETU was initiated to minimize the above stated deficiencies of university graduates. Additional benefits of the program are as follows:

- Students earn money during their coop terms.

- Students discover real life and mature both professionally and emotionally.
- They find jobs more easily after graduation.
- They select their graduation projects from topics in industry.
- Coop education accelerates the development of university-industry and university-business collaboration through interactions with the industry and the business world. Joint research projects can be activated more easily.

In short, the aim of the program is to shift the blue region in Figure 3 towards upper-right; that is, to let the students enjoy the above listed benefits without having to sacrifice from theoretical knowledge and analytical skills.

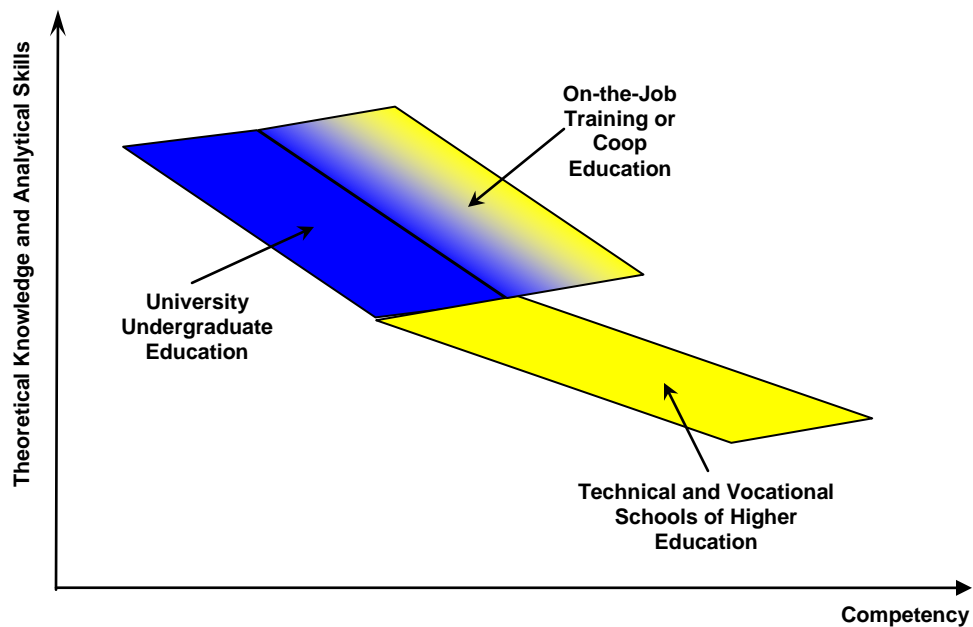


Figure 3. Theoretical knowledge and analytical skills versus competency.

3.2. The methodology and scheduling of the TOBB ETU coop model

TOBB ETU is the only university in Turkey which uses a Cooperative Education Model. TOBB ETU Cooperative Education Model aims for a balanced academic and practical learning for the undergraduate students prior to graduation. This is a degree requirement for all students, including those of the College of Engineering, the College of Science and Letters, the College of Economics and Business Administration, and the College of Fine Arts. TOBB ETU model is based on alternative cycles of academic and in the field practical learning for the sophomore, junior and senior level students. The model is based on paid employment of each student by the employers during their practical terms. The level of payment is in compliance with the Turkish Labor Law.

Problems were encountered in scheduling of the Cooperative Education Model because Turkish Higher Education Law limits the length of all higher education programs to four years, except those for medicine, dentistry and veterinary sciences. Therefore, TOBB ETU coop model had to

be fitted into the current four-year programs. In order to achieve this, an academic year at TOBB ETU is divided into three terms, namely Fall, Spring, and Summer terms, each of which are approximately 3.5 months duration. Weekly hours of courses are increased accordingly in order to compensate for this two-week difference, and classes are scheduled also on Saturdays.

All freshman students are required to register to the introductory course “OEG 101 Introduction to Cooperative Education”, and get a passing grade. The course covers topics such as coop history, coop models in the world, company structures, legal issues, safety rules and regulations. This course is a prerequisite for starting the coop terms at the partner companies and institutions.

Work integrated learning at the partner companies and institutions take place in the sophomore, junior and senior levels. These coop periods are designated by the courses OEG 200 Coop Education 1, OEG 300 Coop Education 2 and OEG 400 Coop Education 3 in the curriculum. The students of each year are divided into three groups. Each term one group goes to coop training while the other two are taking courses in classes. The coop model stipulates for either a full-time class enrollment or a full-time coop employment, which cannot be mixed together in partial loads. Thus, every student goes to coop training one term each year, and attends classes during the rest of the year. This way, prior to graduation every TOBB ETU student will have completed an equivalent of one-year of practical training by companies within his four-year academic life. The schedule of the regular and the coop terms are depicted in Table 2 below:

Table 2. The scheduling of the TOBB ETU coop model.

Year	Academic Term		
	Fall	Spring	Summer
Freshman	In class	In class	Holiday
Sophomore	Group A: Coop Groups B & C: In class	Group B: Coop Groups A & C: In class	Group C: Coop Groups A & B: In class
Junior	Group A: Coop Groups B & C: In class	Group B: Coop Groups A & C: In class	Group C: Coop Groups A & B: In class
Senior	Group A: Coop Groups B & C: In class	Group B: Coop Groups A & C: In class	Group C: Coop Groups A & B: In class

3.3. Coop Education and Career Development Center (COOP-CDC)

An *Advisory Committee* was formed by participation of one representative from each college and five representatives from the commerce or industry (i.e., members of TOBB). Advisory Committee meets at least once a year to develop strategies and make plans for improvement of the coop model.

In order to coordinate the relations between the university, the work places and the students TOBB ETU has established the *Coop Education and Career Development Center (COOP-CDC)* [12]. The center is administered by the *Coop Education and Career Development Center Director*, who is directly responsible to the Rector. An *Executive Committee* for COOP-CDC is established. The committee is chaired by one of the Vice Rectors. One representative from each

college and the center director are the other members of the committee. Executive Committee makes the necessary decisions to solve the problems related to implementation of the coop model. Executive Committee holds its meetings at least once a month or whenever needed.

Duties and responsibilities of COOP-CDC are as follows:

- Searching and finding suitable work places for the coop model.
- Maintaining the student and employer data bases.
- Helping students select the work places according to their individual skills and interests.
- Coordinating the relations between the university and the work places.
- Help students to further develop themselves by making use of various national or international opportunities.
- Follow the students in their careers after graduation.
- Advice the University to make necessary changes in the curriculum based on results obtained through the implementation of the coop model.

Members of COOP-CDC Executive Committee communicate and pay visits with companies all over Turkey to find work places. Since all commercial and industrial companies in Turkey are also members of TOBB, companies have a favorable disposition towards TOBB ETU. The Executive Committee usually first contacts the chambers of industry and commerce in cities for their help in persuading their member companies to join the coop model. Upon mutual agreement, *Coop Protocol's* are signed between the University and the partner companies and institutions. The University has already signed coop protocols with more than 500 companies and obtained about 1100 year-round work places. The total number of students expected to attend coop work places in the academic year of 2008-2009 is around 1000. The sectorial, geographical and departmental distributions of the partner companies and institutions are given in Figures 4, 5 and 6 respectively.

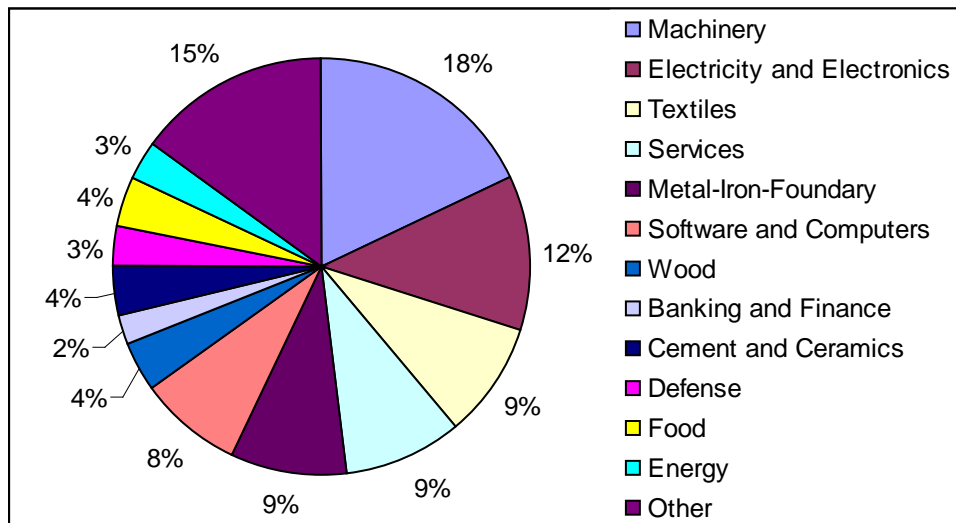


Figure 4. The sectorial distribution of the partner companies and institutions.

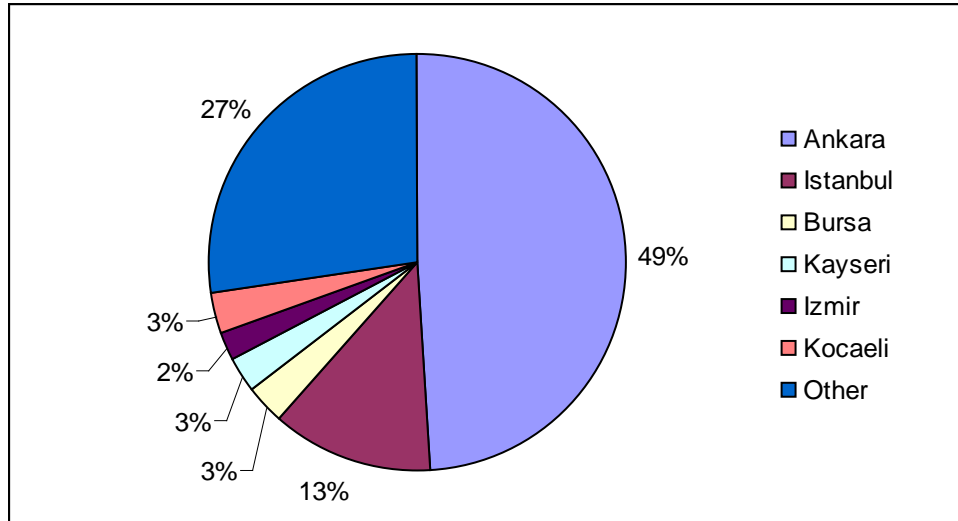


Figure 5. The geographical distribution of the partner companies and institutions.

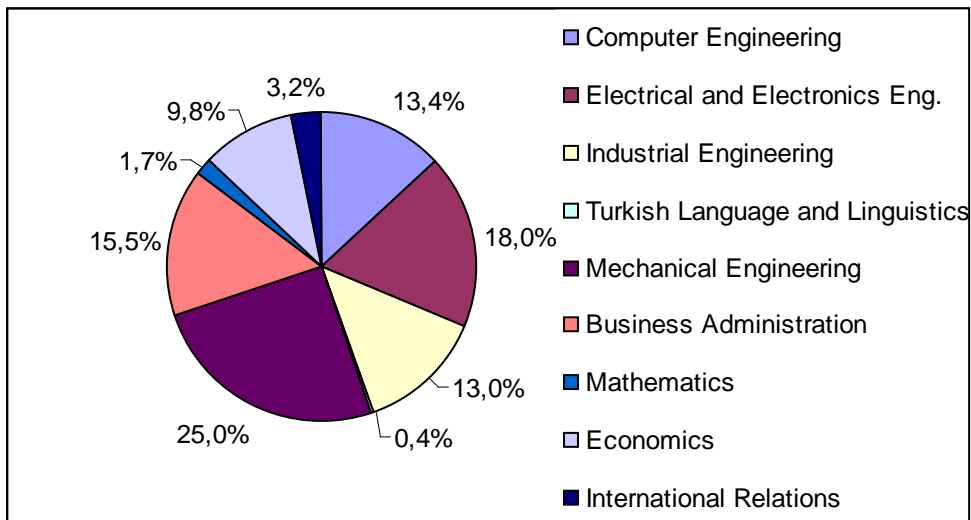


Figure 6. The departmental distribution of the partner companies and institutions.

3.4. Procedure of implementation of the coop model

A flow chart of the coop model implementation at TOBB ETU is shown in Figure 7. The system is dynamically revised based on the evaluations of students, the partner companies and institutions, academic advisers, the jury, the executive committee, and the advisory committee.

Placement of a student to a workplace requires the mutual consent of both sides. Two databases are formed to facilitate matching of students and work places. Namely, an “*Employer Data Base*” that covers relevant information about the partner companies and institutions; and a “*Student Data Base*” that covers relevant information about the academic profiles, interests and skills of the students.

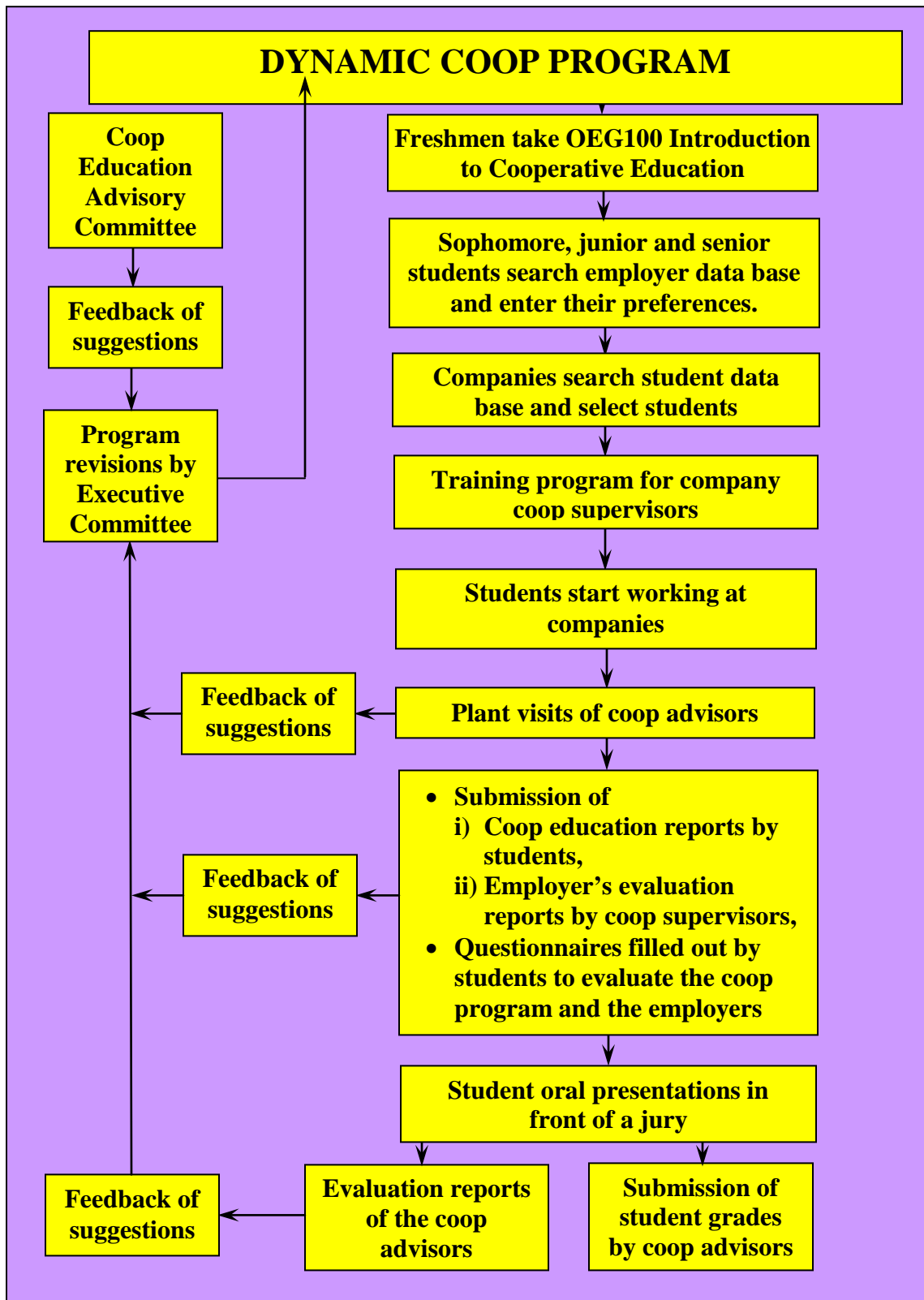


Figure 7. The coop model implementation and the closed-loop evaluation system.

Students use “*Employer Data Base*” to make their company selections. Then, they notify the COOP-CDC about their three choices of the candidate work places. Employers use “*Student Data Base*” to make their student selections. They also notify the COOP-CDC about their three student candidates. The COOP-CDC arranges interviews between students and employers. Final decision is made by the employer based on the results of the interviews and the profile of the student. Employers inform the COOP-CDC about their final decisions. A “*Coop Contract*” between the coop supervisor (on behalf of the work place), the student and the COOP-CDC *Coordinator* (on behalf of the University) is signed. The coop contract describes the program which will be applied to the student. Employer provides information relating to the monthly payment, meals, lodging and transportation.

All students are insured against work place accidents by the university before the start of the coop period. Academic departments appoint “*Academic Coop Advisors*” and work places appoint “*Coop Supervisors*” for each student to monitor and guide the activities of the students during the coop period. The COOP-CDC arranges an informative one-day educational program for the coop supervisors one week before the start of the coop term.

Sophomore students placed in the work places are expected to work as simple workers since their professional qualifications are inadequate. However, their qualifications in English and computer usage, and their intelligence are appreciated by the work places and they generally find themselves in better positions after a short adaptation period. Junior and senior year students are expected to work as interns.

In the course of the working program, each student is guided by his “*Coop Supervisor*”. “*Coop Advisor*” is continuously in touch with the student and the “*Coop Supervisor*”. He visits the work place at least once during the coop term. This way, any possible misunderstanding which may create a problem is resolved beforehand.

The senior students are expected to select the topics of their capstone design projects from the problems they observe at their work places. For this purpose, each student searches and gathers several topics and selects one of them for his design project by consulting his “*Coop Advisor*” and “*Coop Supervisor*”.

At the end of each coop term, each student must complete a “*Coop Education Report*” that describes the experience he has gained through the program as well as the problems he has encountered if any. In parallel, the “*Coop Supervisor*” writes the “*Employers Evaluation Report*”. In this report, student’s performance, attitude, participation, interest and progress are evaluated. Upon completing the coop training, each student must make an oral presentation in front of a jury that is composed of the “*Coop Advisor*” and the other faculty members of the department. The “*Coop Advisor*” makes an evaluation considering the performance of the student in the oral presentation, the “*Coop Education Report*” and the “*Employers Evaluation Report*”, and writes his “*Evaluation Report*”. Finally, the “*Coop Advisor*” grants a Pass or Fail grade to the student. The students who fail must repeat that coop term with another employer.

4. THE RESULTS OF THE FIRST THREE YEARS OF IMPLEMENTATION

All regulatory works and approvals relating to the TOBB ETU Coop Model by the TOBB ETU Senate (4 December 2004), the Board of Trustees (3 January 2005), and the Turkish Higher Education Council (27 December 2005) were completed in the academic year of 2004-2005. COOP-CDC, the Executive Committee and the Advisory Committee were officially formed, and the COOP-CDC Director was appointed. COOP-CDC has shown an outstanding performance and signed coop protocols with 104 companies, mostly in Ankara, and obtained 185 work places within the same academic year.

4.1. The first year of implementation (2005-2006)

The average number of sophomore students in each of the departments was about 25 in the academic year 2005-2006. For this reason, each class was divided into two groups instead of three, and the fall coop period was canceled. Thus, both groups attended classes in the fall term.

In the spring term, first 60 sophomore students were placed in 46 companies all of which were located in Ankara. Since neither the university nor the companies had any previous experience of the coop model, companies in Ankara were preferred in the first term of the coop model to observe the weaknesses and flaws of the procedures more closely. These 60 students started working at the companies on 2 January 2006 and completed their coop periods successfully on 14 April 2006. All of the 60 students got passing grades from the corresponding course OEG 200 Coop Education 1.

In the summer term, 89 sophomore students were placed in 72 companies mostly located in Ankara. 15 students were placed in companies outside of Ankara (one in the USA). Students started working at the companies on 1 May 2006 and completed their coop periods on 11 August 2006. 87 students got passing grades while two students failed.

The evaluation and revision processes were carried out seriously at the end of each term and necessary measures were taken accordingly. These measures involved mostly additional training of the coop supervisors, and closer monitoring of some students facing various problems at their work places. The overall results of the first coop year were very satisfactory. Payments of some successful students were increased by companies above the minimum wage required by the program while some students, although they are only sophomores, got job offers to take effect after their graduation.

4.2 The second year of implementation (2006-2007)

COOP-CDC continued searching and finding suitable work places and extended the search to all over Turkey. Number of coop protocols signed with companies has increased to 250 and the number of work places has reached to 600 at the beginning of the second year. TOBB ETU Senate has approved a proposition by the COOP-CDC to cancel the Fall 2006-2007 coop period again since the total number of students was still small. The students were divided into two groups, and the first group of 151 students has completed their coop periods in the spring term, and all but 2 students have got passing grades from the course OEG 200 Coop Education 2. 160

students have completed their coop terms in the summer term, and all but 3 students have got passing grades from the course OEG 300 Coop Education 2. Figure 8 shows pictures of some students working at the partner companies.

The overall results of the second coop year were also very satisfactory. The experience of the second coop year has contributed significantly to developing procedures of dealing with companies out of Ankara, and scheduling of plant visits to monitor the performances of students.



Figure 8. Two engineering students in coop experience (2 January-14 April 2006)

At the end of the second year the university administration was confident that TOBB ETU can carry out its coop education program with large number of students and with companies and institutions all over Turkey.

4.3 The third year of implementation (2007-2008) and future development plans

The number of coop protocols with companies and institutions has reached to 370 and work places has reached to 740 as of September 2007. This number keeps increasing steadily as officers of COOP-CDC and members of the Executive Committee pay several visits a month to new non-member employers. The numbers of coop protocols and work places as of September 2008 are 507 and 1100 successively. The experience until now has shown that finding placements for students of engineering and business administration departments is quite easy compared to some other departments. However, thanks to the continuous efforts of COOP-CDC to increase the number of work places, this difficulty has been overcome.

Table 2. Students attending the coop terms

Term \ Year	2006	2007	2008
Spring term	60	151	350
Summer term	89	168	328
Autumn term	-	-	445
Total	149	319	1123
Grand Total	1591		

The number of students who had attended the coop education in the academic year of 2007-2008 is given in Table 2 along with the data of the previous years. Calendar year total is more than double of the previous year. 30 students were placed to companies outside Turkey, mostly through Erasmus program.

Students will be encouraged to spend their coop periods abroad in the coming academic years. European Union programs as well as Turkish companies and institutions with operations abroad will be utilized for this purpose. Partnerships with universities abroad which have coop models will be further developed. TOBB ETU has already partnership agreements with Northeastern University, Bremen University of Applied Sciences and Duesseldorf University of Applied Sciences, all of which have some form of coop education. The cooperation with Northeastern University has proven to be especially fruitful. Until now 8 students from that university have spent their coop periods in work places provided by TOBB ETU. Mutually, Northeastern University is expected to provide some work places for the students of TOBB ETU.

5. CONCLUSIONS

TOBB ETU was founded with a keen interest to educate a new generation of students who will become the leaders of community with their spirit of entrepreneurship. The students are aimed to have strong theoretical knowledge, an awareness of the latest technologies in their fields, and the competence to integrate their theoretical knowledge with applications of their professions. TOBB ETU has started the first and only cooperative education program in Turkey to reach these goals. The TOBB ETU's coop model has been very well accepted by its students as well as by the Turkish industry and business. The program is strongly supported by the TOBB member companies. All chambers of commerce and industry in Turkey work actively to recruit companies in their regions to join the TOBB ETU coop model. Already, the number of coop protocols with companies has reached to 507 and the year-round work places to 1100.

The students who have attended the coop terms have contributed great a lot with their labor and abilities to the companies which they have worked for. They have gained tremendously from their coop experience and the discipline of the companies matured them professionally.

The TOBB ETU coop model is closely observed by the other universities in Turkey. Some of them have included the coop model into their strategic plans for future.

The TOBB ETU coop model started producing its main impact on the society when the University gave its first graduates at the end of the academic year 2007-2008. More than 60% of the 89 graduates were hired by the previous coop companies. The model is hoped to create a significant jump in improving university-industry and university-business collaborations.

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