

Changes in Mathematics Teacher Education Programs in Turkey

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Introduction

Information is the most valuable product in the world economy. Changes in the economy have created an increasing need for qualified human resources, which in turn, demand that the quality of education be improved. A fundamental component of an educational system is the teacher. In order to satisfy the country's needs of a higher qualified teaching force the quality of teacher education must be increased. To accomplish these goals the "Turkish Council of Higher Education/World Bank Preservice Teacher Education Project" was started in December 1994. It was a four-year project funded by a 23.1 million US dollars loan from the World Bank to Republic of Turkey and administered by the Turkish Council of Higher Education (YÖK) (Official Gazette, 1990). The project involved all the colleges of education in Turkey which provided teacher education programs for primary and secondary teachers. YÖK began, in 1996, to restructure teacher education programs in colleges of education and to make changes in undergraduate and graduate courses (YÖK, 1998a, 1998b). The new programs were implemented during the fall semester of 1998 (ÖSYM, 1998). The purpose of this paper is to present information about the development of these new mathematics teacher education programs.

Mathematics Teacher Education Programs in Turkey

In Turkey, senior high school students can enter the university depending on their scores on the university entrance examination test (UEE) administered by the Student Selection and Placement Center (ÖSYM). Universities in Turkey have a two-semester per year system, although some of universities offer a summer school session. In Turkey only state universities have colleges of education but some of them may have more than one college of education.

Before the reorganization, mathematics teacher education programs were intended for mathematics teachers who would teach grades 6 through 11. The mathematics teacher programs were offered by departments of mathematics education, which could be a division of the Department of Science Education. Some of colleges of education had more than one department or division of mathematics education. In the 1997-1998 academic year, there were 51 state universities, 37 colleges of education, and 26 departments or divisions of mathematics education for

grades 6 to 11 (ÖSYM, 1997). In the 1998-1999 academic year, these departments or divisions were closed, but their programs are still effective for students enrolled in the former four-year-program.

After the reorganization, the mathematics teacher education programs were divided into elementary mathematics education (6-8 grades)—under the Department of Elementary Education—and secondary mathematics education (9-11 grades)—under the Department of Secondary Science and Mathematics Education. Some colleges of education have more than one division of mathematics education or one division of science education. In the 1998-1999 academic year, there were 51 state universities, 41 colleges of education, 28 divisions of elementary mathematics education (6-8 grades), 12 divisions of secondary mathematics education (9-11 grades), and 20 divisions of science education (ÖSYM, 1998).

The new teacher education programs have four components: general education, professional education, subject matter specialty studies, and electives. Once a preliminary list and a brief description of courses for the programs were determined, YÖK asked colleges of education to start to implement the new programs in the 1998-1999 academic year. Faculty members could add courses that they felt were missing in the list sent by YÖK. Some of courses are new, e. g. "School Experience I", "School Experience II," "Classroom Management," and "Instructional Technology and Material Development." The new changes emphasize methods of teaching and practice. The programs are detailed in the following sections (YÖK, 1998a, 1998b; MEB, 1998).

Elementary Mathematics Teacher Education Program (6-8 Grades)

To be an elementary mathematics teacher, senior high school students have to pass the UEE in order to enter the University. Once a student is enrolled in elementary mathematics education, he or she must choose science education as a minor; if the student is enrolled in the science education program, he or she must choose elementary mathematics education as a minor. The list of courses currently offered is presented in Tables 1 and 2 of the Appendix.

Secondary Mathematics Teacher Education Program (9-11)

To be a secondary mathematics teacher, students must earn a master-without-thesis degree. There are two different implementations for this program, one that lasts 4.5 years after the UEE or one that lasts 5.5 years, which includes a bachelor of science degree. Three years in the first implementation correspond to the duration of taking mathematics courses as subject matter specialty studies, Turkish, history, elective, and

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computer courses. Four years in the second implementation correspond to the duration of receiving the Bachelor of Science degree from the department related to their teaching areas. Courses related to professional education and electives are offered in three semesters more. The computer course is a prerequisite for "Instructional Technology and Material." Students will need to take this course if they have not done so in the first part of the program (see Table 3).

Increasing the Efficiency of the New Teacher Education Programs in Colleges of Education

In order to increase quality of teacher education programs in colleges of education after the reorganization, the resources and activities of YÖK/World Bank Preservice Teacher Education Project were channeled to assist them in the process. Some examples of the resources and activities follow:

- Curriculum development. Teaching-learning materials were produced and sent to colleges of education (e. g. "Teaching Secondary Mathematics I").
- Seminars and panels on methods of teaching and implementation of practice in schools were organized for inservice training of faculty members.
- Seventy-three research/teaching assistants in teacher education programs were sent abroad for complete graduate studies (master and doctoral degrees).
- Eighteen faculty members were sent abroad for post-doctoral studies for 8 months.
- Fifty-one faculty members were sent abroad for inservice training programs for 10 weeks.
- Twelve faculty members and seven teachers were sent abroad for "mentor" training for one month.
- Study abroad tours were organized for presidents of Turkish universities that have colleges of education, its deans, and chairpersons of the departments of teacher education.
- New equipment (laboratory equipment, computers, video-projector, overhead projector, books, etc.) was provided.
- YÖK signed a protocol with the Ministry of National Education (MEB) in 1998 that looked for improving the partnerships and coordination between schools and colleges of education for three teaching practice courses: "School Experience I," "School Experience II," and "Practice Teaching." According to the protocol, the partnership groups should consist of faculty members from colleges of education, teachers from teaching practice schools, and personnel from the Turkish Ministry of National Education. Training courses were held for those teachers and faculty members who were involved with teaching practice courses.
- Studies on the accreditation of colleges of education were started. These still continue (YÖK, 1998a, 1998b, 1998c; MEB, 1998).

In addition to the activities of the Preservice Teacher Education Project, the Turkish Council of Higher Education and the Turkish Ministry of National Education (MEB) have jointly reserved 750 scholarships for complete graduate studies abroad in

order to meet the faculty member needs of Turkish teacher education programs (YÖK, 1998b). Furthermore, by the decision of the Turkish Council of Higher Education General Assembly (No.97.8.144, 19 September 1997), "The National Committee of Teacher Education" was set up to supervise, evaluate and develop the programs implemented in colleges of education (YÖK, 1998a, 1998b). The committee consists of representatives from the Turkish Ministry of National Education, the Turkish Council of Higher Education, and colleges of education (YÖK, 1998a).

It is expected that, in consequence, all the aforementioned activities will aid in the successful implementation of the reorganization of colleges of education and the implementation of the new curricula for teacher education programs. The Turkish Council of Higher Education stated that implementation of these changes was a new start and not an end (YÖK, 1998a). This reorganization must be continuously evaluated, improved, or changed by investigating the needs of Turkey, considering the changing conditions in the world that affect Turkey (YÖK, 1998a).

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Appendix: Curricula Organization

The following tables present the courses that are offered during each semester of the teacher education program, both for mathematics education and science education majors. Each course is allotted a predetermined number of credit hours (C). These include all of the weekly theoretical course-hours (T) plus half of the weekly laboratory, practical course hours (P). History courses (“Principles of Kemal Atatürk I” and “Principles of Kemal Atatürk II”) are non-credit courses.

Table 1. Elementary Mathematics Education Program (Minor: Science Education)

Semester 1	T	P	C
Analysis I	4	2	5
Abstract Mathematics	3	0	3
General Biology I	3	2	4
Principles of Kemal Ataturk I	2	0	0
Turkish I: Written Expression	2	0	2
Foreign Language I	3	0	3
Introduction to Teaching Profession	3	0	3
Semester 2			
Analysis II	4	2	5
Geometry	3	0	3
General Biology II	3	2	4
Principles of Kemal Ataturk II	2	0	0
Turkish II: Oral Expression	2	0	2
Foreign Language II	3	0	3
School Experience I	1	4	3
Semester 3			
Analysis III	4	0	4
Linear Algebra I	3	0	3
General Physics I	4	2	5
General Chemistry I	3	2	4
Developmental Psychology and Learning	2	2	3
Computers	3	0	3
Semester 4			
Analysis IV	4	0	4
Linear Algebra II	3	0	3
General Physics II	4	2	5
General Chemistry II	3	2	4
Curriculum Planning and Evaluation	3	2	4
Semester 5			
Statistics and Probability I	2	2	3
Introduction to Algebra	3	0	3
Laboratory Applications in Science I	2	2	3
Analytic Geometry	3	0	3
Instructional Technology and Material Development	2	2	3
Elective I	3	0	3
Semester 6			
Statistics and Probability II	2	2	3
Elementary Number Theory	3	0	3
Laboratory Applications in Science II	2	2	3
Classroom Management	2	2	3
Special Teaching Methods I	2	2	3
Elective II	3	0	3

Semester 7			
Computer Assisted Instruction in Mathematics Education	3	0	3
Teaching Science	2	2	3
School Experience II	1	4	3
Special Teaching Methods II	2	2	3
Elective III	3	0	3
Elective IV	3	0	3
Semester 8			
Evaluation of Subject Matter Course Books	2	2	3
Counseling	3	0	3
Practice Teaching	2	6	5
Elective V	3	0	3
Elective VI	3	0	3
Total Credit Hours			157

Table 2. Elementary Science Education Program (Minor: Mathematics Education)

Semester 1	T	P	C
Physics I	4	2	5
Chemistry I	4	2	5
Mathematics I	4	0	4
Principles of Kemal Ataturk I	2	0	0
Turkish I: Written Expression	2	0	2
Introduction to Teaching Profession	3	0	3
Semester 2			
Physics II	4	2	5
Chemistry II	4	2	5
Mathematics II	4	0	4
Principles of Kemal Ataturk II	2	0	0
Turkish II: Oral Expression	2	0	2
School Experience I	1	4	3
Semester 3			
Biology I	4	2	5
Chemistry III	4	2	5
Mathematics III	4	0	4
Computer	2	0	3
Foreign Language I	2	0	3
Developmental Psychology and Learning	1	4	3
Semester 4			
Biology II	4	2	5
Physics III	2	0	2
Chemistry IV	2	0	2
Mathematics IV	4	0	4
Foreign Language II	3	0	3
Curriculum Planning and Evaluation	3	2	4

Semester 5			
Physics IV	2	0	2
Biology III	2	0	2
Laboratory Applications in Science I	2	2	3
Mathematics V	2	2	3
Instructional Technology and Material Development	2	2	3
Elective I	3	0	3
Elective II	3	0	3
Semester 6			
Biology IV	2	0	2
Teaching Mathematics	2	2	3
Laboratory Applications in Science II	2	2	3
Classroom Management	2	2	3
Special Teaching Methods I	2	2	3
Elective III	3	0	3
Elective IV	3	0	3
Semester 7			
Science, Technology and Society	3	0	3
Special Concepts in Science I	3	0	3
Biology V	2	0	2
Evaluation of Subject Matter Course Books	2	2	3
School Experience II	1	4	3
Special Teaching Methods II	2	2	3
Semester 8			
Special Concepts in Science II	3	0	3
Counseling	3	0	3
Practice Teaching	2	6	5
Elective V	3	0	3
Total Credit Hours			148

Table 3. Courses for the Three-Semester Complement to Earn a Master's Degree.

Semester 1	T	P	C
Introduction to Teaching Profession	3	0	3
Developmental Psychology and Learning	1	4	3
Curriculum Planning and Evaluation	3	2	4
Special Teaching Methods I	2	2	3
School Experience I	1	4	3
Semester 2			
Instructional Technology and Material Development	2	2	3
Classroom Management	2	2	3
Special Teaching Methods II	2	2	3
School Experience II	1	4	3
Elective I	3	0	3
Semester 3			
Evaluation of Subject Matter Course Books	2	2	3
Counseling	3	0	3
Practice Teaching	2	6	5
Elective II	3	0	3
Total Credit Hours			45

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