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Science Teacher Education in Turkey: What we do? What We expect? A critical study

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ABSTRACT

It is clear that education faculties, where pre-service teachers study, and the Ministry of National Education that provides employment for the teaching profession are expected to be consistent about the competencies and qualifications that must be possessed by the teachers who are to be trained. In this research, an attempt has been made to find out the extent to which the undergraduate programs which are conducted in science teaching departments of the faculties of education and the contents of which are determined by the Higher Education Council, have fulfilled the special field competencies defined by the Ministry of National Education. For this purpose, a descriptive method was adopted, because the present situation was assessed by experts and determined through document reviewing. The experts consisted of 28 academics who work in Science Teaching programs of different universities in Turkey. Attention was paid to the possession of at least a PhD degree by these experts in the field of science teaching who had studied science teacher education. At the end of the study, it was found that there were some conflicts in the special field competencies between the undergraduate education plan in Science Teacher Education and the expectations of the Ministry of National Education.

Keywords:
Science teacher education, teacher competencies, special field competencies, Turkey

Introduction

In schools, a good education must be given to progress as a society and reach the developed level of welfare. One of the factors that affects the increase in the teaching quality is the qualifications of the teachers (Ergun, Yurdatapan and Sürmeli, 2013). Qualifications necessary for teachers are the most significant part of the teacher training process. This subject is discussed continuously in our country and often mentioned in the researches that include reform practices in our teacher training policies (Aslan, 2003; Bilir, 2011; Genç, 2005; Köksal, 2008; Şişman, 2009). The common purpose of these reform practices is the adequate training of teachers who will be assigned by the education system.

Science Teacher Education and Employment in Turkey

Institutions such as Village Institutes, Educational Institutes, and Educational Academies undertook the duty of training teachers in Turkey with the Proclamation of the Republic (Başkan, 2001). However, universities became the only source in terms of training teachers in every area (like science, mathematics, music, etc.) after 1982 (Kavcar, 2002). During this period, when the duration of compulsory education was five years in our country (from 1982 to 1997), only the classroom teaching departments were opened at universities for primary education grades. The other teaching departments, for example, the secondary education science, and the math and social studies departments became the source of employment for these teachers. Projects were carried out with the cooperation of the MNE, Higher Education Council (HEC) and the World Bank to

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increase the quality of teacher training towards the end of the 1990s. As a result of these initiatives, a restructuring period was initiated in the faculties of education based on a decision by the Higher Education Executive Board in 1997. First of all, the duration of compulsory education was increased to 8 years (5 years in elementary + 3 years in primary school at 1997) at that time. Subsequently, the Primary Education Departments were established to train teachers for disciplines like Science, Math and Social Studies. As of the academic year 1998-1999 rearranged teacher training programs were introduced at universities (HEC, 2007). One of these programs is Science Teaching. During the next process, positive and negative aspects of these programs were discussed, revisions were made, and the courses were rearranged to accommodate changes that were made in the curricula of primary schools in 2006, resulting in the program in its current form. Teachers who successfully graduated from this program needed to obtain a sufficient score from the KPSS (Public Personnel Selection Examination) held by ÖSYM (Ölçme, Seçme ve Yerleştirme Merkezi-Measurement, Selection and Placement Center), an institution connected to the state, in order to work in state schools. After fulfilling the condition of the required score, they are appointed by the MNE, which is responsible for the educational policies of the country, and they begin as Science Teachers in schools connected to the state.

General and Special Field Teacher Competencies

Institutions The Ministry of National Education (MNE, 2008) adopted an integrated and systematic approach within the scope of the studies it conducted together with its shareholders for achieving teacher competencies. The MNE sought answers to questions such as "How should the teaching quality in the 21st century be?" and "What qualifications should the students and teachers have?" As a result, it was decided to determine the general competencies of the teaching profession, as well as the sub-competencies and the performance indicators in each of these sub-competencies. Based on the assumption that teachers' competencies must cover not only the knowledge but also skills and attitudes, "teachers' competencies" were defined as "the knowledge, skills and attitudes that must be possessed to perform teaching effectively and efficiently" (MNE, 2008; p.viii). In this sense, it was decided to use the emerging competencies in the determination of the teacher training policies, pre-service educational programs of the teacher training institutions, in-service training of the teachers, selection of the teachers, and the evaluation of the teachers' performances and career development process. In line with this purpose, the general competencies that must be possessed by teachers eventually comprised of six main competencies under the titles of "personal and professional values", "knowing the students", "learning and teaching process", "observation and evaluation of learning and development", "school-family and social relationships" and "program and content knowledge", and 31 sub-competencies and 233 performance indicators under these general competencies.

After the determination of the general competencies of the teaching profession, steps were initiated for the improvement of the special field competencies, which are defined as "the knowledge, skills and attitudes that must be possessed exclusively to the fields to perform the teaching profession effectively and efficiently" (MNE, 2008; p.viii). Special field competencies of the teaching profession took their latest form and were put in practice in 16 fields including science courses following the workshops and mutual consultations held by the ministry. The special field competencies consist of the following components:

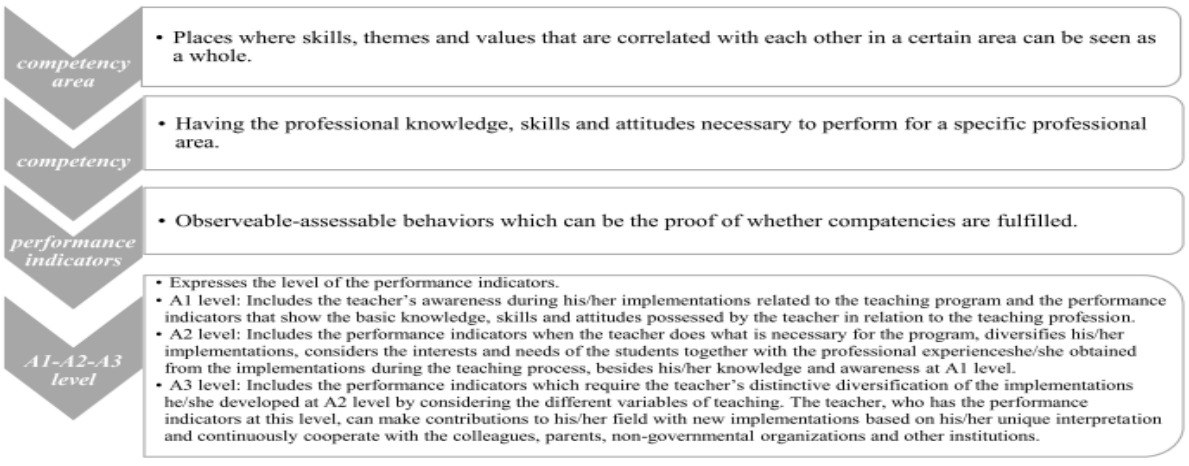

Figure 1. Special field competencies of the teaching profession (compiled from the MNE, 2008)

Science Teacher Special Field Competencies

Institutions Teaching Science is the primary task of a science teacher. In this respect the role of the science teacher in society is crucial as they have the great responsibility to teach science in an effective way so that the nation can produce competent manpower in the field of Science and Technology. To accomplish this challenging task, science teachers not only need to develop and implement appropriate Science pedagogy but also need to demonstrate successful pedagogical competencies in the classroom (Panda, 2012). Teachers who begin their profession are expected to have gained some field competencies specific to the sciences together with the aforementioned general competencies. To become a science teacher, as different from teachers in other subjects, and to maintain their professional skills, some science-specific competences are necessary (European Commission (EC), 2011). Special field competency areas of the science teachers are as follows in Turkey:

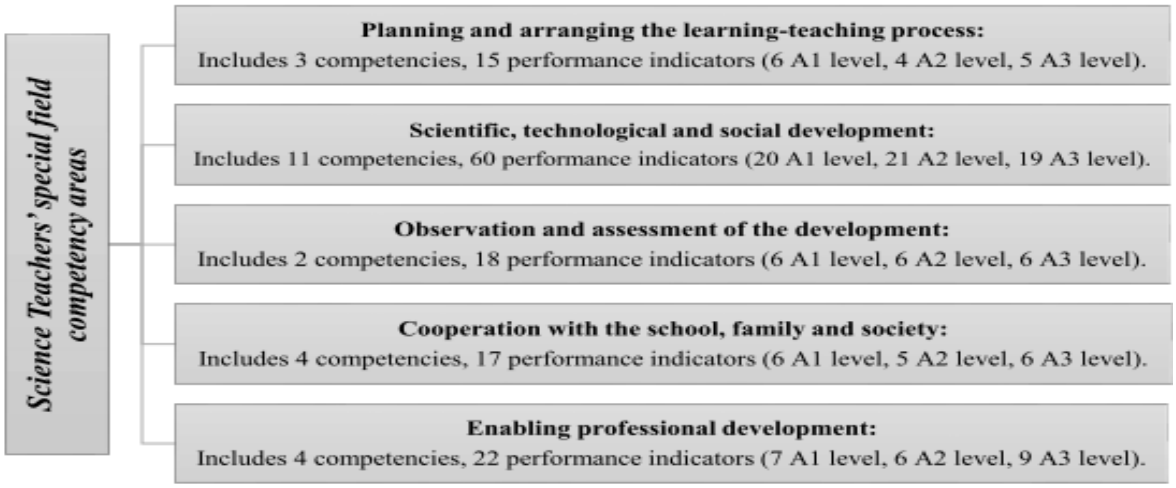

Figure 2. Special field competency areas of science teachers

These competencies were published by the MNE (2006) and were aimed at the standards that must be possessed by teachers. "Teachers' competencies must be provided with the theoretical and practical tasks presented to the pre-service teachers and reach the expected levels during the teacher training process" (CHE, 1998). With this statement, the duty of providing the teachers with the determined standards was given to the education faculties which have the responsibility of training teachers. Besides, it was also mentioned clearly in different researches (Kurudayıoğlu and Tüzel, 2011; Çakmak and Civelek, 2013) that the institutions training teachers must consider the competencies determined by the MNE and provide the pre-service teachers with an education in this direction. Accordingly, education faculties, where pre-service teachers study, and the MNE that provides employment for the teaching profession, are expected to be coherent in terms of the competencies and qualifications that must be possessed by the teachers that are to be trained. Studies in this matter are observed in the fields of Classroom Teaching (Çakmak and Civelek, 2013) and Turkish Teaching (Kurudayıoğlu and Tüzel, 2013) across Turkey. In relation to the field of Science, a study was conducted by Ergun, Yurdatapan and Sürmeli (2013) examining the special field competencies in the opinions of the pre-service teachers. This study is significant in terms of the evaluation of the expected competencies by the pre-service teachers. According to Appleton (2006), teacher preparation educators can build programs that provide teachers with the skills and competencies that they need to teach science, as well as the collaborative skills needed to implement a specialist model of elementary science instruction within the larger school context. So people who work in the faculties who are responsible for providing the teachers with these specified competencies are naturally important personnel of this process. Moreover, it cannot be ignored that people who work in education faculties that train teachers are primarily responsible for the exhibition of the expected competencies by the teachers whom they have trained, in places where they are employed. Accordingly, this study has been conducted on the basis that a more extensive assessment is also important by receiving the opinions of the experts who train teachers.

In this research, an attempt was made to reveal how much the undergraduate programs, which are conducted in science teaching departments of the faculties of education and the contents of which were

determined by the HEC (2006), fulfilled the special field competencies defined by the MNE. In line with this purpose, answers were sought to the questions below:

Are the contents of the courses in the Science Teaching Undergraduate Program and the content of the special field competencies theoretically parallel to each other?

How successful is the Science Teaching undergraduate Program in providing the teachers with the special field competencies developed by the MNE that are expected of teachers?

Method

Research with non-experimental descriptive designs summarizes the present or past status of a case and seek an answer to the question "What?" It reports "What" the case is without any intervention (McMillan and Schumacher, 2006; p.215). In this research, the descriptive method was adopted, because the present situation was assessed by experts and the data collection determined with document review tool.

First of all, the contents of the special field competencies of science teaching courses, which were included in the science teaching undergraduate programs and contents of which were specified by the HEC, were analyzed and compared within the scope of the research. In this comparison, the main point is the expression of competencies that are expected from the teacher. The purpose behind the expression of the competencies and the expected behavior, and the contents of the undergraduate program courses, explaining which courses could provide the expected behavior, were examined. Theoretically, after the examination of the given course-expected competencies relationship, it was revealed how much this relationship could practically be achieved with the help of experts' opinions. Numeric data, which were used for the research, were collected through document review by receiving experts' opinions. Experts consisted of 28 academics (22 male, 6 female and 12 of them are 0-5 years, 10 are 6-10 years and 6 are 10 and above year experience after Ph. D.) who work in Science Teaching programs of different universities in Turkey. Attention was paid to the possession of at least a Ph.D. degree by these experts in the field of science teaching and consisting of people who had studied science teacher education. Today, 67 state universities have Science Teacher Education programs in Turkey. These programs and the content of these courses were determined by the HEC (can see in appendix), so the Science Teacher candidates in all programs (totally 67) have to all take the same courses. An attempt was made to reach a maximum number of experts from every university and the data of 28 academics who responded via e-mail, were used. The activities requested from the experts during the assessment and scoring process, and the stages are schematized in Figure 3:

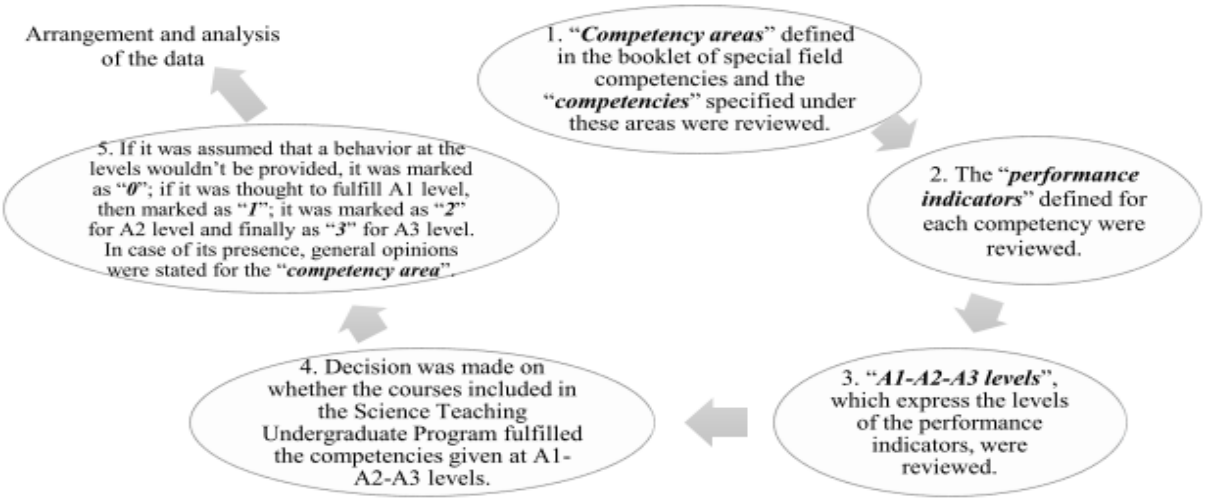

Figure 3. Assessment process and scoring for the experts

As specified in Figure 3, experts were requested to examine the special field competencies and score their opinions at the A1, A2 and A3 levels (please look at figure 1 for detailed explanation about levels) of the performance indicators for the courses included in the Science Teaching undergraduate programs where they work. These scores were then analyzed with the SPSS packaged software. A sample scoring is shown below:

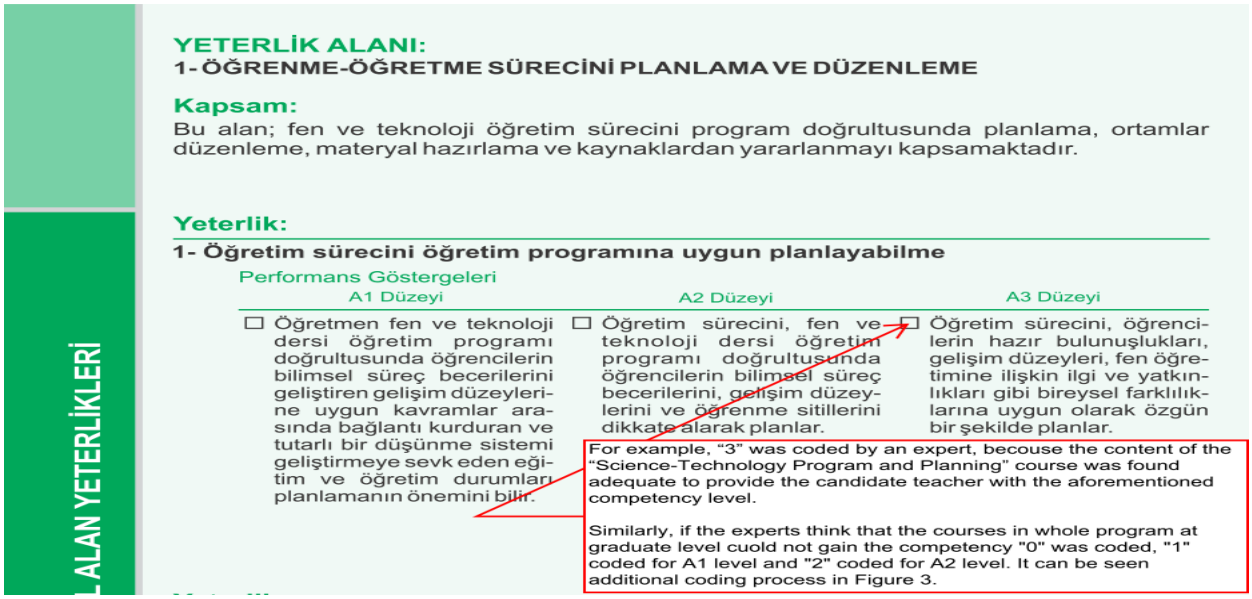

Figure 4. A sample scoring by an expert (in the figure the document view was given in its original language Turkish).

As the main purpose of the research is the experts' evaluation of whether the competencies desired from the teachers can be provided with the courses included in the undergraduate programs, the concordance between the experts must first be calculated for the analyses. Concordance between the experts was calculated with the "Kendall's W" test. Kendall's W (Kendall's Coefficient of Concordance) is a non-parametric test which aims at determining the degree of the concordance (Cohen, Manion and Morrison, 2007), and places the assessments made by more than two experts in order and examines whether or not there is a significant concordance between them (Can, 2014). As the value calculated for the test approaches 1, a high concordance is indicated between the experts (Legendre, 2005). Also Mazurek (2011) states that, it ranges from 0 – no agreement, to 1 – complete agreement. As a result of the Kendall's W test, it was checked whether the concordance between the experts was statistically significant and enough high. Then, the scores that the experts gave were examined and interpreted to determine the level of these scores for each of the 24 (3 for Planning and arranging the learning-teaching process, 11 for Scientific, technological and social development, 2 for Observation and assessment of the development, 4 for Cooperation with the school, family, and society an lastly 4 for Enabling professional development competency areas) competencies. In the last stage, if the experts had an extra opinion about providing each of the competency areas, it was examined, and the expressions of opinions were categorized.

Findings

In order to interpret the validity of the data obtained as a result of the experts' assessments, whether or not there was a statistically significant concordance between them was tested through the Kendall's W and the results are given below:

Table 1. Results of Kendall's W test

Number	28
Kendall's W	.784
Chi-square	1009.697
df	23
Asymptotic significance (p)	.000

A significant and high concordance is observed between the expert assessments as shown in Table 1 (W=.784, $p < 0.05$). Responses given by the experts for the levels of the competencies of the courses in the undergraduate programs that they will be able to fulfill and their descriptive statistics are given in table 2 below. Expected competency-given course relationship is explained before every table.

When the special field competencies are viewed, the first of the competency areas appears as "planning and arranging the learning-teaching process." It was stated by the MNE that this area included planning the science and technology teaching process according to the program at the primary education level, arranging environments, preparing materials and making use of sources. It is realized when the competencies (Table 2) and performance levels regarding this area are examined that the contents (see in appendix) of the courses "Science-Technology Program and Planning", "Teaching Technologies and Material Design", "Special Teaching Methods", which are included in the science undergraduate programs, and implementations conducted by the pre-service teachers in primary schools can provide the teachers with this competency area. In parallel, the experts who participated in the assessment expressed similar opinions (Table 2).

Table 2. Descriptive statistics for the competency area "planning and arranging the learning-teaching process"

Competency	◎	A1 level		A2 level		A3 level		"0"	
		n	%	n	%	n	%	n	%
1. Ability to plan the teaching process in compliance with the teaching program	2.75	0	0	7	25	21	75	0	0
2. Ability to arrange learning environments in line with the teaching program during the teaching process	2.64	0	0	10	36	18	64	0	0
3. Ability to use materials and sources that support the teaching program during the teaching	2.36	0	0	18	64	10	36	0	0

When Table 2 is examined, it is found that the experts believed that the competencies given in the competency area "planning and arranging the learning-teaching process" would be fulfilled by pre-service teachers at a high level in the courses included in the programs. Experts who expressed their opinions about this competency area agreed with the view that courses like "Science-Technology Program and Planning" and "Teaching Technologies and Material Design" would fulfill the competencies expected in this area.

Another special field competency expected from science teachers is the competency area "Scientific, technological and social development". The scope of this area was defined by the MNE as the implementation of students' recognition and examination of the environment, developing scientific process skills, providing an understanding of the nature of science and its historical development, critical thinking, developing problem-solving skills, using the scientific and technological concepts correctly and efficiently, making sense of the science and technology relationship, reflection of Atatürk's opinions and views about science and technology, providing an understanding of the scientific and technological developments, the interaction between society and the environment and the ability of taking necessary safety precautions in the teaching environment. On examination of the contents of the science undergraduate programs, the courses (appendices for the contents), which are likely to provide the pre-service teachers with these 11 sub-competencies, and the views which appeared as a result of the experts' assessment are given in Table 3.

It is seen in Table 3 that some courses through which the competencies from the area "scientific, technological and social development" could be provided to the pre-service teachers are included in the undergraduate programs. However, although the contents of some courses are theoretically thought to provide the expected competencies, expert assessments explicitly show that these courses will not be adequate practically for the high-level of expectations of the pre-service teachers. It is seen that when the findings are reviewed the experts revealed their opinions about the possibility that competencies numbered 1, 5 and 10 could be provided at the A2 and A3 levels. Besides, it can be said that no courses for the competency numbered 8 are present. For the remaining competencies, the expert assessments suggest that the undergraduate courses will only provide achievements at the A1 level. When the experts' opinions are considered, it is possible to provide the pre-service teachers with the concepts (for example, nature of science, scientific and technological concepts, etc.) mentioned in some competencies through undergraduate courses. However, experts also mentioned about the worries related to how the pre-service teachers will provide their students with an understanding of these concepts when they become teachers.

Table 3. Descriptive statistics for the competency area "scientific, technological and social development"

Competency	The courses which could gain the competency to teacher candidate	◎	A1 level		A2 level		A3 level		"0"	
			n	%	n	%	n	%	n	%
1. Ability of arousing curiosity in students to know and examine their environment	Environmental Science, Geology	2.65	0	0	10	36	18	64	0	0
2. Ability to develop the scientific process skills of the students	Scientific Research Methods, Special Teaching Methods	1.64	10	36	18	64	0	0	0	0
3. Ability to provide the students with an understanding of the nature of the science and historical development	Nature of Science and History of Science	1.43	16	57	12	43	0	0	0	0
4. Ability to develop the critical thinking skills of the students	Special Teaching Methods	1.39	17	60	11	40	0	0	0	0
5. Ability to develop the problem-solving skills of the students	Scientific Research Methods, Special Teaching Methods	2.46	0	0	15	54	13	46	0	0
6. Helping the students with using the scientific and technological concepts correctly and efficiently	Computer, Special Topics in Physics, Chemistry, and Biology	1.50	14	50	14	50	0	0	0	0
7. Helping students with making sense of the science and technology relationship	Special Topics in Physics, Chemistry, and Biology	1.46	15	54	13	46	0	0	0	0
8. Ability to reflect Atatürk's opinions and views about science and technology on the implementations during the teaching process	Nature of Science and History of Science	0.57	16	57	0	0	0	0	12	43
9. Ability to provide the students with an understanding of scientific and technological developments and the interaction between the society and the environment	Science-Technology Program and Planning	1.29	20	71	8	79	0	0	0	0
10. Ability to take the necessary safety precautions in the science and technology teaching environment	Science Teaching Lab. Implementations	3.00	0	0	0	0	28	100	0	0
11. Ability to perform implementations considering the students that have specific needs and need special education	Special Education	1.39	17	60	11	40	0	0	0	0

Table 4. Descriptive statistics for the competency area "Observation and assessment of the development"

Competency	◎	A1 level		A2 level		A3 level		"0"	
		n	%	n	%	n	%	n	%
1. Ability to observe the development of the students	2.75	0	0	7	32	21	68	0	0
2. Ability to assess the data obtained from the applied assessment instrument	2.32	0	0	19	64	9	36	0	0

It is realized when Table 4 is examined that the experts agree with the view that competencies expected for the competency area "observation and assessment of the development" could be fulfilled by the courses of the undergraduate programs. The scope of this competency area was determined as the implementation of determination, observation and assessment of the students' developments within the teaching process. Within this scope, it is understood that when the contents of the courses in the undergraduate programs are considered the implementation of the course "Assessment and Evaluation" (appendices for the content) will sufficiently provide the pre-service teachers with those competencies.

Table 5. Descriptive statistics for the competency area "cooperation with the school, family, and society"

Competency	◎	A1 level		A2 level		A3 level		"0"	
		n	%	n	%	n	%	n	%
1. Ability of cooperation with the families to enable the development of the students in topics such as environmental awareness, science, and technology literacy, which they may need in daily life	0.50	14	50	0	0	0	0	14	50
2. Ability of cooperation with the society to make the school a cultural and learning center	0.36	10	36	0	0	0	0	18	64
3. Ability of social leadership	0.14	4	14	0	0	0	0	24	86
4. Ability to enable the students to become aware of the meaning and importance of the national celebrations and ceremonies and to participate actively in them.	0.00	0	0	0	0	0	0	28	100

Another competency area, which is expected from the science teachers, was determined as "cooperation with the school, family, and society". The scope of this area was determined as cooperation with families, social leadership, making the school a cultural and learning center and implementations in relation to the ceremonies and organizations at school for the purpose of supporting the teaching process. It was noticed that when the courses of the Science Teaching undergraduate programs were viewed that no courses were available to provide the pre-service teachers with this competency area and its sub-competencies. Similarly, it is seen upon examination of the expert opinions that the area, where the courses of the undergraduate programs would mostly be incapable of fulfilling the competencies expected of the teachers, is "cooperation with the school, family, and society". Experts mainly stressed in their opinions that teachers received no training with respect to cooperation with the family within the scope of the undergraduate programs, and thus they needed to gain those competencies with their own efforts only after they became teachers.

Finally, experts' assessment scores are seen in Table 6 for the competency area "enabling professional development". The scope of this competency area was related to the development of the teacher for supporting the teaching process. No courses were directly encountered with regard to professional development when the contents of the courses in the undergraduate programs were viewed. Besides, it is seen that when the competencies in Table 6 are considered the courses in the undergraduate programs would not be able to fulfill the high-level of expectations according to the experts' opinions. Especially for the competency numbered 2, several of the experts expressed that it was difficult to provide the expected competency only with the help of one course and agreed that the candidates had to make an effort in this matter after they became teachers.

Table 6. Descriptive statistics for the competency area "enabling professional development"

Competency	◎	A1 level		A2 level		A3 level		"0"	
		n	%	n	%	n	%	n	%
1. Ability to designate their professional competencies	1.50	14	50	14	50	0	0	0	0
2. Enabling individual and professional development for science teaching	0.43	12	43	0	0	0	0	16	57
3. Ability to make use of scientific research methods and techniques in the implementations related to the professional development	1.64	10	36	18	64	0	0	0	0
4. Ability to make use of the information technologies for the professional development and communication	1.36	18	64	10	36	0	0	0	0

Conclusion and Suggestions

It was proposed by the MNE (2006) that the competencies were to be used in teacher training policies, pre-service educational programs of the teacher training institutions, in-service training of the teachers, selection of the teachers, evaluation of the teachers' performances and finally in the career development process. The duty of providing the teacher with these prepared competencies was given to the teacher training institutions (Çakmak and Civelek, 2013; Kurudayıoğlu and Tüzel, 2011; YÖK, 1988). It is observed in the explanations of the HEC (2006) about the new programs that would be implemented in the faculties of education that the reason behind updating the course contents of the teacher education programs was mainly "the changes made by the MNE in the primary education programs to be implemented as of the academic year 2003-2004". In 2008, the special field competencies of Science Teachers were published (MNE, 2008), while in 2013, changes were made in the primary education curricula again, and their new formats were put into practice. Teacher education programs (same since 2006) were not organized according to the special field competencies when this chronology is taken into account. When the reason behind the real update in the changes in the primary education curriculum is considered (CHE, 2006), it was found that they were not revised according to the changes that were conducted in the primary education curricula in 2013. It is thus observed that the courses that were conducted in the institutions that were training science teachers needed a serious change and improvement.

In this research, an attempt was to make to reveal how much the undergraduate programs, which are implemented in science teaching departments of the faculties of education and contents of which were determined by the CHE (2006), fulfilled the special field competencies specified by the MNE. It was observed that after the evaluation of the experts' opinions that the programs used in the faculties of education had difficulty in fulfilling the competencies expected from the science teachers mostly in the competency areas "cooperation with the school, family and society" and "enabling professional development". In the study conducted by Ergun, Yurdatapan and Sürmeli (2013) with pre-service science teachers, the teachers stated that the competency area "cooperation with the school, family and society" would not be provided by the courses they took. They expressed that the other competency areas could be provided with the help of the courses that they took. A large degree of variability is observed for the competency area "Scientific, technological and social development". It was concluded that there were no courses for some competencies while the courses given to the pre-service teachers would provide other competencies almost completely. According to the expert assessments, it emerged that the competency areas "planning and arranging the learning and teaching process" and "observation and assessment of the development" could be provided in the science teacher training programs. In other studies conducted for fields Turkish teaching (Kurudayıoğlu and Tüzel, 2013) and Classroom teaching (Çakmak and Civelek, 2013) the expectations gained from graduate level courses are enough high. These results are similar for science teaching special competencies.

With respect to the results of the research, the requirement specifically arises for providing the pre-service teachers with courses by which they would be able to improve themselves especially in school-family cooperation and professional development. Besides, a different range of courses must be presented to the pre-service teachers relating to science and technology and their implementation in the students' daily lives in order to eliminate the deficiencies observed for the topic of scientific, technological and social development. Another negative situation, which emerges on the examination of the competencies discussed within the scope of this study and determined by the MNE, appears to be the courses presented to the pre-service teachers (appendices). Although science teachers take many courses (for example, physics, chemistry, biology, evolution, etc.) especially on science while completing their higher education, a point of criticism is the lack of expectations related to their professional lives. Consequently, it is clearly a big problem that needs to be solved in Turkey: Can we not train science teachers or do we expect the impossible from science teachers that we train?

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Appendix 1. Whole course lessons of Science Teacher Education program in Turkey built by HEC. For all contents of Science Teacher Education courses you can visit: http://bbs.duzce.edu.tr/Ders_Plani.aspx?bno=197&bot=223

I. Semester

General Physics I
Basic Physics Laboratory I
General Chemistry I
General Chemistry Laboratory I
General Mathematics I
Ataturk's Principles And History Of Revolution I
Turkish I: Written Expression
Introduction to Educational Science

II. Semester

General Physics II
Basic Physics Laboratory II
General Chemistry II
General Chemistry Laboratory II
General Mathematics II
Ataturk's Principles And History Of Revolution II
Turkish II: Oral Expression
Psychology of Education

III.Semester

General Biology I
General Biology Laboratory I
General Physics III
General Physics Laboratory III
General Chemistry III (Analytical Chemistry)
Computer I
Foreign Language I
Teaching Principles and Methods

IV. Semester

General Biology II
General Biology Laboratory II
Introduction to Modern Physics
General Chemistry IV (Organic Chemistry)
Computer II
Foreign Language II
Science Technology Program and Planning

V. Semester

Human Anatomy And Physiology
Special Topics in Physics
Special Topics in Chemistry
Statistics
Laboratory Applications in Science I
History Of Turkish Education
Scientific Research Methods
Material Development and Teaching Technology

VI. Semester

Genetics And Biotechnology
Nature and History of Science
Environmental Sciences
Geology
Laboratory Applications In Science II
Community Services Activities
Private Teaching Methods I
Measuring and Evaluation

VII. Semester

Special Topics In Biology
Evolution
Private Teaching Methods II
Special Educatıon
School Experience
Guidance
Classroom Management

VIII. Semester

Astronomy
Teaching Practice
Turkish Education System and School Management