# IN-SERVICE EDUCATION AND TRAINING NEEDS OF SCIENCE TEACHERS RELATED TO 2004 SCIENCE AND TECHNOLOGY CURRICULUM IN TERMS OF FIELD AND METHODOLOGY KNOWLEDGE

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# In-Service Education and Training Needs of Science Teachers Related to 2004 Science and Technology Curriculum in Terms of Field and Methodology Knowledge

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| PISA | Program for International Student Assessment |
| OECD | Organization for Economic Co-operation and Development |
| PIRLS | Progress in International Reading Literacy Study |
| TIMSS | Trends in International Mathematics and Science Study |
| MEB | Ministry of National Education |
| TTKB | Board of Education, Board of Instruction and Education |
| INSET | In-Service Education and Training |
| TNA | Training Needs Assessment |
| SKA | Skills-Knowledge-Ability |
| HEDB | Head of In-Service Training Department |
| LTL | Living Things and Life |
| MC | Matter and Change |
| PE | Physical Events |
| EU | Earth and Universe |
| STSE | Science-Technology-Society-Environment |
| SPS | Scientific Process Skills |
| AV | Attitudes and Values |
| GASTC | General Approaches of Science and Technology Curriculum |
| STL | Science and Technology Literacy |
| MATM | Measurement-Assessment Techniques and Methods |

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ABSTRACT

This cross-sectional survey study investigated INSET needs of teachers related to 2004 Science and Technology Curriculum applied from $4^{th}$ to $8^{th}$ grades in terms of field and methodology knowledge with ten different dimensions. Data were collected with a questionnaire responded by 304 teachers (196 female and 108 male) working in 54 different primary state schools in Istanbul and applying science and technology curriculum. Reliability of the instrument was established by applying internal consistency approach and its Cronbach alpha value is 0.992. The findings of descriptive statistics indicated that INSET needs of teachers related to Physical Events (PE) dimension has the highest mean. Teachers may need INSET for field knowledge such as *applying experiments in physics subjects, inside of matter*, *cellular biology and ecology, research studies and subjects about universe*; for methodology knowledge such as *important points in the general approaches of the curriculum* and *alternative assessment tools*. In addition, INSET needs of teachers about subjects of $7^{th}$ and $8^{th}$ grades are higher than those of other grades in all dimensions. Analysis of variance F-test results showed that INSET need of teachers related to the curriculum was significantly different with reference to their area of specialization. In contrast, there is no significant difference between INSET needs of teachers and their some demographic variables. Furthermore, independent samples t-test results showed that INSET needs of male and/or married teachers are different from those of their female and/or single counterparts. Finally, results of Pearson Product Moment Correlation analysis indicated that there were high and positive correlations between INSET needs related to each dimensions of the study. In conclusion, this research study has both important suggestions for further studies and valuable implications for teacher educators and INSET program planners.

# ÖZET

Bu kesit alan tarama çalışması; 4. sınıftan 8. sınıfa kadar uygulanan 2004 Fen ve Teknoloji Programı ile ilgili, öğretmenlerin hizmet içi eğitim (HIE) ihtiyaçlarını, alan ve yöntem bilgisi yönünden araştırmaktadır. Veriler, İstanbul'daki 54 farklı ilköğretim devlet okulunda çalışan ve fen ve teknoloji programını uygulayan 304 öğretmenin (196 kadın ve 108 erkek) cevaplandırdığı ölçekle toplanmıştır. Ölçeğin güvenirliliği, iç tutarlılık yaklaşımıyla oluşturulmuş ve Cronbach alfa değeri 0,992 olarak bulunmuştur. Öğretmenlerin HIE ihtiyaçlarının, Fiziksel Olaylar (FO) boyutu için en yüksek ortalamada olduğunu tanımlayıcı istatistiğin bulguları belirtmektedir. Öğretmenler alan bilgisi için, örneğin; fizikte deneylerin uygulanması, maddenin içi, hücresel biyoloji ve çevrebilim, evren hakkında konular ve araştırmalar; yöntem bilgisi için, örneğin; müfredatın genel yaklaşımlarının önemli noktaları ve alternatif değerlendirme araçları gibi konularda HIE'e ihtiyaç duyabilmektedirler. Ek olarak, tüm boyutlarda, 7. ve 8. sınıf seviyesindeki konular hakkında öğretmenlerin HIE ihtiyacı diğer sınıf seviyelerininkinden daha fazladır. Öğretmenlerin müfredata yönelik HIE ihtiyaçlarıyla onların uzmanlık alanları arasında anlamlı farklılık olduğunu varyans analizi F-test sonuçları göstermektedir. Buna karşılık, öğretmenlerin HIE ihtiyaçları ve onların bazı demografik değişkenlerinin arasında anlamlı bir farklılık yoktur. Ayrıca bağımsız örneklemler t-testi sonuçları, erkek ve/veya evli öğretmenlerin HIE ihtiyaçlarının, kadın ve/veya bekâr öğretmenlerinkinden farklı olduğunu göstermektedir. Son olarak, Pearson Çarpım Moment Korelâsyon analizinin sonuçları, çalışmanın her bir boyutu ile ilgili HIE ihtiyaçları arasında yüksek ve pozitif korelâsyonlar olduğunu belirtmektedir. Sonuç olarak, bu araştırma hem ileriki çalışmalar için önemli öneriler, hem de öğretmen eğitimcileri ve HIE programı planlayıcıları için değerli çıkarımlar içermektedir.

# CHAPTHER I

# INTRODUCTION

## 1.1. Statement of problem

World is developing in the perspectives of science and technology in every passing day. Developing countries want to keep pace with developed countries in these perspectives. Education is the most effective and important key to reach the level of developed countries in order to be modern, developed, independent and democratic society. Although education is a long-term investment, it is the fundamental investment of economy because it enables social and economic improvement of the country. However, there are some problems in Turkish education system even though education is known as the most effective key in social and economic improvement (Gedikoğlu, 2005).

The results of international exams show that there are some problems in Turkish education system related to teacher quality and curriculum. PISA (Program for International Student Assessment) is one of these international exams applied 2000, 2003, 2006 and 2009 years. Turkey attended to these exams except the one applied in the year of 2000. According to the reports of PISA 2003 and PISA 2006, Turkey's science scores in these exams were significantly below the average of OECD (Organization for Economic Co-operation and Development) countries. Besides PISA, TIMSS (Trends in International Mathematics and Science Study) and PIRLS (Progress in International Reading Literacy Study) are international exams applied periodically in many countries and the results of these exams are very similar with PISA. Application of so many exams internationally and regularly is aimed to improve quality of education and to increase success of students all over the world. Countries which entered these exams should checkout their educational system and improve it according to their international exams' results.

Ministry of National Education in Turkey took consider the results of these international exams and student selection exams for high school and university. According to these results, curriculum in primary education was planned to make changes. Science curriculum, from 4$^{th}$ to 8$^{th}$ grades in primary education, was changed in 2004 according to deficiencies of previous science curriculum and reports about how science curriculum was applied in developed countries. After a pilot program application, the new curriculum, science and technology curriculum for 4$^{th}$ and 5$^{th}$ grades, started to be applied in 2005. After that, science and technology curriculum was applied for 6$^{th}$, 7$^{th}$ and 8$^{th}$ grades progressively in 2006, 2007, 2008. There are many different points of views between 2002 and 2004 science curriculum. These differences are in learning areas of science, assessment techniques and methods, teaching strategies, and philosophy of science curriculum (TTKB, MEB, 2006).

Because of the differences between 2002 and 2004 science curriculum, some studies mentioned that in-service-training needs of teachers who would apply the new science curriculum have occurred in the learning areas and application of curriculum. According to research studies of Canpolat (2006) and Ogan-Bekiroglu (2007), science teachers have some misconceptions about science learning areas. Former study mentioned about misconceptions of undergraduate students in Primary Science Teacher Department. These science teachers, who are now applying new science curriculum, have had misconceptions about evaporation, evaporation rate and vapor pressure which are the concepts of chemistry. The latter study is also about misconceptions of pre-service physics teachers. The study implied that they have had inconsistent mental models about Moon and some lunar phenomena which are the concepts of astrophysics. Beside deficiencies of science teachers in learning areas, there are studies emphasized that science teachers have problems in applying science and technology curriculum. Research study conducted by Gökdere and Çepni (2004) mentioned that science teachers needed INSET about project based learning and laboratory applications which are the fundamental issues of teaching science. Science teachers who are applying new science and technology curriculum commented that in-service trainings were inadequate for them and that they have needed training about teaching and assessment methods (Erdoğan, 2007). Then, all these studies show that science teachers need in-service training in order to apply 2004 Science and Technology Curriculum in an effective way. For this reason, in-service training programs should not include only general topics of science education program but also specific topics of science education like physics, chemistry and biology.

Before planning an in-service training program, planner should know what is related to teachers' in-service training needs. In-service training needs of teachers might change with how many times teacher attended to training programs. It can be also related to gender, marital status and experience of teachers. Educational background of teachers might influence in-service training needs. It means that faculty of graduation; branch like science, physics, chemistry, biology, classroom teacher and others; level of graduation of teachers might have relation with training needs of science teachers.

## 1.2. Purpose of the study

The aim of this research study is to assess in-service education and training needs of science teachers related to 2004 Science and Technology Curriculum from $4^{th}$ to $8^{th}$ grades. Since studies mentioned above explains that science teachers' needs are related to both subjects of science and methodology of science and technology curriculum, the current study examines in-service training needs of science teachers according to two aspects which are methodology knowledge with three different dimensions and field knowledge with seven different learning areas.

### 1.2.1. Research Questions

In order to fulfill main purpose of the study which is to assess in-service training needs of science teachers in terms of field and methodology knowledge according to 2004 Science and Technology Curriculum, the research questions of the current study are as followed;

**1.** In which learning area of Science and Technology Curriculum do science teachers need in-service training?

**2.** What is the level of in-service training needs of science teachers about science teaching methods?

**3.** In which grades do science teachers need mostly in-service training according to acquisitions of Science and Technology Curriculum?

4. Does science teachers' level of in-service training need significantly differ according to numbers of attendance to in-service education programs planned by Ministry of National Education about 2004 Science and Technology Curriculum?

5. Is there a significant difference between in-service training needs of science teachers and their occupational experience?

6. Does the level of in-service training needs of science teachers differ significantly from their area of specialization?

7. Does being graduate from faculty of education or not have significantly difference with in-service training needs of science teacher?

8. Does educational background of teachers differ significantly from their in-service training needs?

9. Is there a significant difference between level of in-service training needs and their gender or marital status?

## 1.3. Significance of the Study

Assessment of in-service training needs is crucial concept in planning teacher training programs. For effective in-service education and training programs, they should be planned according to the needs of teachers. Therefore, there is a need to support practice of needs assessment and research studies about needs assessments of teachers (Noh, Cha, Kang, & Scharmann, 2004 and Ogan-Bekiroglu, 2007).

There are many research studies in the literature about in-service training in Turkey. However, small number of these research studies is about in-service training needs of science teachers. In the study of Ogan-Bekiroglu (2007), in-service training needs of Turkish high school science teachers were determined and the relationship between their needs and demographic variables was examined. Moreover, Asilsoy (2007) improved an in-service training program in order to prepare biology teacher to apply project based learning approach in their lesson. Besides this study, research study implemented by Şenel (2008) similarly developed an in-service training program for science teachers. The training program was planned to increase knowledge of science teachers about alternative assessments techniques such as portfolio, performance assessment, and structured grid and diagnosis branches tests. Finally, Gökdere and Çepni (2004) proposed to assess in-service education and training needs of science teachers who are teaching gifted students with the help of needs assessment approach.

Although all these studies mentioned here are related to in-service needs of science teachers, each of them has some missing points when the current study is considered. First of all, in-service training needs of primary science teachers are assessed in this research study. Secondly, needs of science teachers are assessed in terms of field knowledge and methodology knowledge. Thirdly, "2004 Science and Technology Curriculum" is taken in the consideration during the needs assessment of science teachers. Since there has been no research study on the same topic, this study will fill in this gap in literature. This study will also be source for new research studies.

Results of this study may be used by Ministry of National Education. In-service training programs planned to apply for science and technology teachers may be prepared according to the results of this study which shows what science teachers need about 2004 Science and Technology Curriculum. Results of the study may give a suggestion to Head of In-Service Training Department what science and technology teachers need with respect to their gender, their marital status, their occupational experience, being graduate from faculty of education or not, and educational background of teachers. Similarly, faculties of education may use the results of this study to plan their education programs in which teachers of future are educated. Finally, results of the study introduce a new scale which can assess needs of science teachers about the curriculum. Any organization can use it to plan an INSET for science teachers.

### 1.4. Assumptions

It is assumed that sample group including primary science teachers from 4$^{th}$ to 8$^{th}$ grades represents population of the research study. It is another assumption that validity and reliability of data collection instrument are in the optimal level.

Since the teachers are in the field of science, it is estimated that they are aware of the concepts of Science and Technology Curriculum. Moreover, it is supposed that all participants answered the items in the questionnaires honestly and faithfully.

### 1.5. Limitations

There are a number of limitations needed to be considered in the study. First of all, data collection instrument, questionnaire, was applied to Turkish elementary science teachers who worked in randomly selected 54 primary state schools in Istanbul, Turkey. For this reason, findings and results are valid for sample group of research study and may not be generalized to whole Turkey. Secondly, results of the study are limited to views of participants answered the questionnaire. Finally, application of questionnaires to science teachers worked in just only primary state schools can be a limitation because science teachers worked in primary private schools also teach 2004 Science and Technology Curriculum. However, private schools' teachers may be trained much more than state schools' teachers. For this reason, they were out of sample group in this research study.

## 1.6. Definitions of Terms

Science and Technology Curriculum: A program planned by Ministry of National Education in 2004 and applied from $4^{th}$ to $8^{th}$ grades to educate students as scientifically literate (TTKB, 2004).

INSET (In-Service Education and Training): A series of structured and planned activities proposed to develop professional performance of employee in an organization (Henderson, 1978; Day, 1999).

Need: A desire of performance improvement in current status or a deficiency in a performance that does not meet the present situation (Barbazette, 2006)

Training need: A deficiency between actual and desired performance of employees in an organization and that can be closed by training for performance improvement (Peterson, 1998; McConnell, 2002).

Needs assessment: A process to get information about an organization's needs or its employees' needs which can be met by an effective training program (Barbazette, 2006; Gupta, Sleezer, & Russ-Eft,2006).

Training Needs Assessment: A process to gather information about performance deficiency which is the difference between expected and perceived job performance of individual (Camp, Blanchard, & Huszczo, 1986)

# CHAPTER II

# REVIEW OF LITERATURE

Review of literature part includes theoretical knowledge and related research studies about in-service training and needs assessment. There is also a brief introduction of 2004 Science and Technology Curriculum.

## 2.1. In-Service Education and Training

In-Service Education and Training, abbreviated as INSET, is a series of structured and planned activities proposed to develop professional performance of employee in an organization (Henderson, 1978; Day, 1999). In a **training** program, differently in an education program, employees of an organization learn new information and applications which are focused on specific skills. After the **training**, in the work place, employees have chance to apply what they have learned before. On the other hand, in an **education** program, everyone in the organization gets general knowledge, not a specific skill, which may not be implemented in the work place by each individual (McArdle, 1998).

In-service education and training program are necessary for teachers' professional development. Guskey (2000) defined professional development as a purposely, continuing and systematic process. He explained that professional development improves knowledge, skills and attitudes of teachers about education, helps teachers to create new instructional media and corrects inadequacies of teachers in skills and knowledge.

### 2.1.1 Importance of In-Service Education and Training?

In-service teacher education is important for enhancement of society because teachers needed to improve their skills and knowledge serve for the society in which they live (Ogan-Bekiroglu, 2007). By the way, teaching is a continuing learning because knowledge base in all subject areas develops rapidly. So, teachers need to catch the changing and developing knowledge in order to be expert in education. New educational reforms also expect teachers, school administrators, and educational authorities to take their own responsibilities for improvement. Since teachers need to continue learning throughout their lives, they can follow new knowledge in informal ways like reading educational material or attending educational meetings. However, in order to make this system formally, teachers need to attend INSET programs well-planned and addressed the needs of teachers (Oğuzkan, 1997; Guskey, 2000)

Ogan-Bekiroglu (2007, p. 441) agrees with Veenman, Tulder, & Voeten (1994, p. 305) about three main purposes of in-service teacher education. These are also the importance of in-service training. First of all INSET programs foster teachers in order to improve their skills and knowledge. These programs are applied teachers to follow new knowledge and skills about their subjects. Secondly, after teachers learn new knowledge and skills from training programs, this helps them to improve their practice in schools. Teachers have chance to apply new activities or approaches in their classes. Finally, teachers learn not only skills and knowledge which are necessary in teaching process both also new pedagogical methods to educate students.

### 2.1.2. Fundamentals of an Effective In-Service Education and Training?

Because of the rapid changes in educational systems, knowledge and technology, teachers need to have effective in-service education and training to follow them. Camp, Blanchard, and Huszczo (1986) made a sequential model of an effective training program includes eight steps; data gathering to make diagnosis, establishing objectives, identifying resources used during training, developing curriculum for training, planning logistics, applying training program, facilitating transfer of learning and data gathering to make evaluation of training. There is always feedback step between planning of training and application of training. This sequential model includes several key elements to create an effective INSET. First of all, training should be like a learning experience or a learning activity. Teachers should get new information from training program to use it in classroom environment.

Secondly, Camp, Blanchard, and Huszczo (1986) mentioned that an effective training program should be a well planned organizational activity. Ogan-Bekiroglu (2007) similarly explained this second key element that an effective training should be at a proper time and location in order to increase participation of teachers. Moreover, Hernandez, Arrington, & Whitworth (2002) highlighted that activities should be designed to increase the amount of time in which teachers shared ideas with other teachers. This will support to emerge innovations in education.

Thirdly, if a training program can advance organizational goals, it would be an effective one. For instance, a training program should build basic facilities which are necessary to support professional development. Final key element for an effective training is to be responsive to identified needs of teachers. So, training programs should be designed according to needs of teachers and to be adaptive for changing needs of teachers. (Camp, Blanchard, & Huszczo, 1986 and Ogan-Bekiroglu, 2007) For this reason, needs assessment is necessary to find needs of teachers. Needs assessment applications should be supported and more needs assessment research studies should be performed as much as possible (O'Sullivan, 2000).

### 2.1.3. In-Service Education and Training in Turkey?

In-service training programs are executed by Education Committee and Head of In-Service Training Department in Turkey. Education Committee is responsible to determine general policies of Ministry of National Education in terms of in-service training. This committee also identifies in-service training needs and assesses results of in-service training programs. Head of In-Service Training Department annually prepares and implements in-service training programs which supply personnel's needs. Ministry of National Education explains some aims of INSET in the regulation of in-service training (MEB, 1994). Four of them are as followed: supplying personnel's deficiencies related to professional competence; giving personnel knowledge about innovations and development in the area of education; enabling personnel to be promoted; sustaining development of education system.

Since 2004, Ministry of National Education has been planned and applied some kinds of in-service training programs related to 2004 science and technology curriculum for teachers who have been applying the curriculum. These training programs included some seminars such as Teaching Science, Introduction of Science and Technology Curriculum, Project Development Techniques, Education of Nature and Erosion, New Approaches in Measurement and Assessment Techniques, Application of Agriculture and Animal Husbandry, Usage of Science and Technology Experiment Kits, Usage of Science and Technology Equipments. Name of each in-service training program, number of participants for each program, where and when the programs applied are presented in Table 1 (HEDB, 2010).

*Table 1: In-Service Training Programs Applied and Planned To Apply Between June of 2004 and August of 2010*

| Name of the In-Service Training Program | Number of participants | City | Date |
|---|---|---|---|
| Teaching Science | 100 | Yalova | June 2004 |
| Project Development Techniques | 50 | Van | July 2005 |
| Education of Nature and Erosion | 40 | Bolu | July 2005 |
| New Approaches in Measurement and Assessment Techniques | 81 | Rize | June 2006 |
| Application of Agriculture and Animal Husbandry | 120 | Kastamonu | October 2007 |
| Application of Agriculture and Animal Husbandry | 58 | Aksaray | November 2007 |
| Introduction of Science and Technology Curriculum | 120 | Van | June 2008 |
| Usage of Science and Technology Experiment Kits *(from 4th to 8th grades)* | 30 | Rize | July 2008 |
| Usage of Science and Technology Equipments | 30 | Bartın | July 2009 |
| Usage of Science and Technology Equipments | 30 | Rize | July 2009 |
| Usage of Science and Technology Equipments | 30 | Bartın | June-July 2010 |
| Usage of Science and Technology Equipments | 30 | Rize | July 2010 |
| Usage of Science and Technology Equipments | 30 | Mersin | August 2010 |

According to Table 1, 10 in-service training programs, related to 2004 Science and Technology Curriculum, applied from June of 2004 to July of 2009. Three of them were about using science and technology equipments. One of them was about new approaches in assessment and measurement techniques. While one of these programs aimed to introduce Science and Technology Curriculum, another one was generally about teaching science. There were also 3 different kinds of programs concerned with science and teaching science. Head of In-Service Training Department has been planned to implement three more programs about using science and technology equipments for science and technology teachers from June to August of 2010. Approximately 650 teachers have been trained about science and technology curriculum since 2004. 90 science and technology teachers will also be trained in 2010.

Despite of the aims of INSET mentioned in the regulation of in-service training prepared by Ministry of National Education, Ogan-Bekiroglu (2007) explains that there are three main problems related to in-service training programs in Turkey. The first problem is that programs are planned poorly and executed inadequately because planners fail to consider teachers' needs and interests. The second one is related to functional or operational problems such as unrelated activities and time demands. The last problem is about lack of research studies or empirical base to make rational decisions. Therefore, there should be more empirical studies about needs of teachers. These studies should provide data to Ministry of National Education to use in decision making regarding the contents of in-service programs. Furthermore, needs assessment should be repeated from time to time. So, existing in-service training programs can be changed or adapted to meet the emerging or changing needs of teachers. In addition, Ministry of National Education should establish partnerships between universities and others providing professional development programs to apply reform activities such as study groups, mentoring and coaching which are more responsive to how teachers learn.

## 2.2. Needs Assessment

Barbazette (2006) defines **need** as a desire of performance improvement in current status or describes it as deficiency in a performance that does not meet the present situation. There is another way to describe "need" that some other researchers are all of one mind. Need is a gap or a measurable discrepancy between actual and target states (Kaufman, et al., 1993; Altschuld & Witkin, 1995, 2000; Rossett, 1987).

According to Peterson (1998) and McConnell (2002), **training need** is a deficiency between actual and desired performance of employees in an organization and that can be closed by training for performance improvement. McConnell (2002) examined 4 **kinds of training needs** which are organizational training needs, individual employee training needs, recognized training needs, and requested training needs. On one hand, **organizational training needs** should be met according to organization's objectives. On the other hand, **individual employee training needs** should be met according to what a specific needs, such as skills, abilities, of an individual. Another kind of training need is **recognized training needs**, which also called planned training needs because organization assumes that all employees have already this kind of training needs and it makes plan to meet these needs. The last one is **requested training needs** which are not planned. The need of employees about requested training is determined according to their performance, changes in job or employee and organizational motivation.

As mentioned above, training need is a deficiency that can be closed by training and that is between actual and desired status of an employee or an organization. So, determination of training needs has an important place in planning training programs. Organizations or trainers should establish training needs in order to hinder misconceived or worthless trainings. If an organization does not plan training with training needs of employees, it may cost company too much money. In order to have cost effective training, companies or government should have to plan trainings according to results of training needs assessments (Peterson, 1998).

In order to take consider the results of training needs assessment before planning a training program, the definition of needs assessment should be known well by organizations or trainers. There are many resources in the literature about what needs assessment is and it is defined in some ways. In one way, Barbazette (2006) and Gupta, et al (2006) defines **needs assessment** as a process to get information about an organization's or its employees' needs which can be met by an effective training program. In another way, **needs assessment** can be explained in three steps according to its descriptions made by Kaufman, et al (1993) and Witkin & Altschuld (1995). First of all, needs assessment is a procedure to get information about gaps between actual and desired status of organization in a specific context. Secondly, needs assessment makes a priority order for these gaps. This enables ranking the needs of organization for a specific topic. As a result, the third step of the definition is to select the most important needs of organization which can be met by training. According to this definition, needs assessment has two parts which are identification of needs and analysis of needs (Witkin & Altschuld, 1995). The first step of needs assessment's definition is needs identification part of needs assessment and the last two steps are needs analysis parts of the needs assessment.

### 2.2.1. Importance of Needs Assessment

A person, an organization or a government should be aware of importance of needs assessment before planning to apply training. **Importance of needs assessment** may examined in **three dimensions**.

The first dimension is **allocation of resources** that is highly related to companies and government. Needs assessment determines criteria to allocate resources, such as money, people, facilities and time which will be used in training (Witkin & Altschuld, 1995). Thus, needs assessment protects wealth of companies by correct allocation of resources which are targeted for just training issues (Barbazette, 2006). The second dimension of importance of needs assessment is **management** considered again by companies and government. Organizations which applied needs assessment have chance to get subjective data about a problem or a new system (Rossett, 1987) and this will help them to cope with the problem. Since organizations get results of needs assessment applied before training, they can stand by their decisions which are defensible. The last dimension is **training** that is especially considered by trainers and trainees. Barbazette (2006) explains that needs assessment enables to determine what trainees' performance deficiencies are and what their training needs are. As a result, trainers can easily find real problem and get information to determine appropriate training program (Kaufman & English, 1979).

All in all, companies or government which take consider these three dimensions, that are importance of needs assessment, recognize what employees' training needs in a best way. So, they have chance to apply necessary training program for their employees.

### 2.2.2. Key Elements of Successful Needs Assessment

To be aware of importance of needs assessment is not enough to apply successful needs assessment. There are some key elements of successful needs assessment mentioned by Witkin & Altschuld (1995). First of all, needs assessment should be known as **a participatory process** which means people whose training needs are examined attend actively needs assessment process. Moreover, participation of all employees in a needs assessment of a company called **broad-based participation** is valuable and necessary. Since necessity of broad-based participation is a key element of successful needs assessment, Ministry of National Education should consider all teachers' needs from different regions of Turkey in order to apply a general training program.

As mentioned before, needs assessment is a process to get information about needs of employees can be met by training. Hence using **appropriate means** to gather data about important issues is another key element to be successful in needs assessment. For this reason, before planning needs assessment process, data gathering methods and tools, interview, survey, observation etc., should be determined. Furthermore, data gathering is a part of needs assessment, not just needs assessment in itself. Needs assessment is totally a **decision making process** about critical issues of participants. Therefore, **core values of participants** should be taken into account while making decisions about their needs.

In addition to these five key elements of successful needs assessment (Witkin & Altschuld, 1995), McArdle (1998) says “a needs analysis is not a one-time event”. Therefore, needs assessment should be applied regularly, like once a year or two years, to get correct data about needs of employees and results of training. So, successful needs assessment is a **continuous process** which is another key element.

### 2.2.3. Needs Assessment Approaches

Gupta (1999) classified needs assessment into four different approaches according to its purposes. These are strategic needs assessment, competency-based needs assessment, job task needs analysis and training needs assessment.

The first one, which is **strategic needs assessment**, is used to determine existing performance problems of an organization. It may also help organizations to examine long term performance needs and to make improvement plan. It would be useful when organizations need to make long term solutions about their performance improvement. The second needs assessment approach is **competency-based assessment** which is used to identify competencies for a specific job. This approach enables organizations to make a competency model which describes knowledge, skills and attitudes for superior level of a job. Thirdly, **job and task analysis** focuses on information about scope, responsibilities and tasks necessary to perform a job. When organizations make new job descriptions or change existing ones, this approach will be helpful. Moreover, this approach enables to identify required skills of employees which are different in both entry-level and senior level of a job. The last one is **training needs assessment** which creates needs assessment report and training plan. This can be used when a new system and technology, revision and updating of existing training program, new job responsibilities, upgraded jobs are occurred for an organization. In this approach, organizations can examine which knowledge and skills needs exist among employees and which ones can be met with a new training program. Organizations may use this approach when they want to determine training needs of employees and develop a training plan which will meet these needs.

Without considering which needs assessment approach is used, the important point is that "needs assessments set the direction for all performance improvement initiatives in an organization, but organizational politics can affect how needs assessments are conducted or implemented in the workplace" (Gupta, 1999). This means that organization should decide in itself which approach is appropriate for organization's environment and needs.

### 2.2.4. Training Needs Assessment

Training Needs Assessment (TNA) is one of the needs assessment approach in which needs of individual or organization are determined and in which organizations can make training reports and plans to meet these needs. Camp and et al (1986) explain that TNA is a process to gather information about performance deficiency which is the difference between expected and perceived job performance of individual so that TNA enables to decide whether implementation of a training program can reduce the deficiency of individual. In addition, the aim of these training programs is generally to meet the instructional needs. In order to measure success in training programs, objectives should be determined before training program is developed (Goldstein, 1986).

Brown (2002) and Goldstein (1986) explained similarly why TNA should be applied before planning of training programs. First reason is TNA identifies specific problem areas of organization which can be solved with a proper and a successful training program if there is a need to apply training. Secondly, TNA enables to get the support of management department. Trainers will be able to prove that there is an improvement in job performance by conducting TNA in training program. This will help managers to get into training. Thirdly, in order to get significant results from evaluation of training programs, TNA develops data about needs of organization before training. Finally, TNA may enable organization to get benefits of training. Organizations pay too much money to different kinds of training programs which cannot be sometimes useful for development of performance because of the undetermined needs of organization or employees. Unless the source of performance deficiency is determined, training programs will not be effective and their cost values will be increased rapidly.

Camp, Blanchard, and Huszczo (1986) explain a general TNA model with four steps. According to that model, defining the deficiencies in behavioral terms is the first step. Organizations should describe the problem behaviorally in order to apply proper TNA program. In the second step of general TNA model, deficiencies of organization are prioritized in terms of organizational goals, availability of resources and probability of success. This organizational analysis finds answer which problem should be solved in order to get greatest organizational benefit. Three types of analysis should be implemented during the third step of model. These are job, task, and work environment analyses. Job analysis obtains information about job requirements such as performance, behavioral, and skill-knowledge-ability (SKA) requirements. Person analysis is determined whether there is a lack of SKA which could cause to deficiencies. Work environment analysis assesses whether skill-knowledge-ability (SKA), motivation, and opportunity to perform a job are found. The last step of general TNA model is the description of objectives to be achieved in training. Training program can be planned by taking consider of these objectives. After the application of training program, TNA can be improved by using feedbacks of training and organizational development.

## 2.3. Related Studies

The research study of Ogan-Bekiroglu (2007) has aimed to determine in-service needs of Turkish high school science teachers and to examine relationship between their professional development needs and demographic variables. The study has been also found out why teachers did not want to attend in-service education programs. In order to complete aims of the study, the researcher applied Turkish translation of Science Teachers Inventory of Need (STIN-2) with 0.97 Cronbach alpha value to 422 science teachers from 75 high schools in Istanbul. The study was limited with 54 items of the survey which may not represent all needs of science teachers. Variables of the study were outcome of measure which was teachers' need; predictor variables related to teachers which were gender, teaching experiences, highest degree earned, principal teaching assignment; and predictor variables related to schools which were types of school, number of computers in school, frequency of lab sections, adequacy of lab equipment. According to the results of the study, science teachers' main in-service needs were mostly related to "delivering science instruction" and "administering science instructional facilities and equipment". However, these science teachers' needs about "improving personal competence", “management of science instruction”, “diagnosis and evaluation of learners” and “planning science instruction” were in the lowest level. Moreover, the study showed that female teachers’ in-service needs were higher than male teachers’. Also, the study implied that when teachers were more experienced, they need less in-service training. Similarly, teachers whose educational background was higher level, they needed less in-service education. The study indicated that there was not a statistically significant relation between teachers’ needs and their demographic variables. Finally, the researcher mentioned about barriers preventing teachers to attend in-service training programs. The most important barriers were “inconvenient time”, “location of program”, and “the program failing to meet teachers’ needs”. For this reason, Ogan-Bekiroglu emphasized that in-service training programs should be planned according to the needs of teacher so that training needs assessment should be applied regularly.

Study of Tahee Noh et al (2004) was about to find out perceived professional needs of Korean science teachers especially in chemical education and to determine whether they preferred to be trained with online or on-site in-service education programs. Moreover, the results were compared with needs and preferences of pre-service and in-service teachers. Researchers, like in the study of Ogan-Bekiroglu (2007), applied Science Teacher Inventory of Need (STIN) to 120 secondary school teachers and 67 pre-service teachers with a chemistry background. According to the results of this study, the perceived professional development needs of Korean in-service and pre-service teachers with chemistry background were found to be very strong. The strongest need is about how to motivate students to learn science. The other strongest needs are defining the reasons for teaching science, preparing instructional materials, conducting a laboratory session, and updating personal knowledge in chemistry, other science content areas and science-societal issues. Moreover, in-service teachers' needs were significantly higher than those of pre-service teachers' needs in some aspects. Preferences of Korean teachers with a chemistry background generally tend to prefer online in-service teacher training to traditional one.

The cross-sectional survey study of Osman, Halim, and Meerah (2006) was aimed to identify perceived needs of 1690 practicing secondary school science teachers characterized by gender, school location and area of specialization like physics, chemistry, and biology in Malaysia. Researchers developed a needs analysis instrument, like in the studies of Ogan-Bekiroglu (2007) and Noh, Cha, Kang, and Scharmann (2004), by using the Science Teacher Inventory of Needs (STIN) improved by Zurub and Rubba in 1983. The first section of the instrument seeks information on the demographic characteristics of samples; the second section includes 72 items can be categorized in to eight different dimensions by using three-point Likert scale ranging from 1 to 3 (not needed-moderately needed-greatly needed). These dimensions are *management of science instruction*, *diagnosis and evaluating students*, *administering science instructional facilities and equipment*, *planning activities in science instruction* which are similar in the instrument used in the studies of Ogan-Bekiroglu (2007) and Noh, Cha, Kang, and Scharmann (2004). Differently from these studies' instruments, it also includes some other dimensions which are *generic pedagogical knowledge and skills*, *knowledge and skills in science subjects*, *integration of multimedia technology in science teaching*, and *use of English language in science teaching*. Reliability coefficient of the needs analysis instrument for eight dimensions ranges from .674 to .953. The results of the study demonstrated that more than 60.0% of the science teachers need to improve knowledge and skills in all eight dimensions. The highest percentages of greatly needed scale are respectively the *use of English language in science teaching* dimension (59.5%) and the *integration of multimedia technology in science teaching* dimension (51.2%). The highest percentages of moderately needed scale are respectively the *generic pedagogical knowledge and skills* dimension and the *administering science instructional facilities and equipment* dimension (51.7%). The needs of science teachers about *administering science instructional facilities and equipment*, *diagnosing and evaluating students for science instruction*, and *managing and delivering science instruction* are not significantly related to gender of teachers ($p<.05$). However, the other dimensions are significantly related to gender. Except the *knowledge and skills in science subjects* dimension, needs of science teachers in all other dimensions are significantly related to location of school like rural or urban area ($p<.05$). Moreover, needs of science teachers in the *knowledge and skills in science subjects*, *managing and delivering science instruction* and *integration of multimedia technology in science teaching* dimensions are not significantly related to area of specialization of science teachers. On the other hand, other dimensions have significantly relation with area of specialization ($p<.05$). All in all, the researchers found out needs of science teachers in order to make effective in-service training programs upgraded their knowledge and skills in Malaysia.

### 2.4. 2004 Science and Technology Curriculum

Science and Technology Curriculum from $4^{th}$ to $8^{th}$ grades prepared by Ministry of National Education can be examined in to two main sections (TTKB, 2004). The first section called fundamentals of the curriculum includes philosophy of curriculum related to its vision, technology dimension of science, its purposes, and learning-teaching –assessment techniques. Acquisitions of science and technology from 4th to 8th grade, activity samples and explanations about learning-teaching-assessment are demonstrated in the second section of science and technology curriculum, called Learning Areas and Units

Vision of science and technology curriculum is the first fundamental issue. This vision is that all students can be educated as scientifically literate although they have individual differences. Since teacher centered and traditional teaching methods are not enough to develop scientific literacy skills of students, its seven dimensions should be taken into account while educating students as scientifically literate (TTKB,2006). These are nature of science and technology, key concepts of science, scientific process skills, relations of science-technology-society-environment, scientific and technical psychomotor skills, values about essence of science and attitudes and values about science. Students who are educated by depending on these seven dimensions of scientific literacy can increase their self-esteem and motivation about learning science. Then, they can search and inquire by themselves in order to reach their questions.

Technology dimension of the curriculum is the second fundamental issue of science and technology curriculum. While students are learning science, they realize technology dimension of science. Scientific knowledge can be used to understand natural world and technological knowledge is used to change natural world in order to meet needs and demands of human beings. In this context, there are many examples from daily life about refraction of scientific knowledge on technology.

General objectives of science and technology curriculum are the third fundamental issue in this curriculum. As mentioned in the vision of curriculum, science and technology curriculum propose to educate students as scientifically literate so that there are some general aims in order to accomplish vision of the curriculum. According to these aims, science and technology curriculum enables students

- To learn and understand nature of world
- To understand relations of science-technology-society-environment
- To gain skills in order to construct new knowledge
- To know different occupations related to science and technology
- To use scientific process skills in decision making

The last fundamental issue of the curriculum is learning-teaching-assessment techniques. Science and technology curriculum depends on constructivist learning approach. Therefore, students are expected to construct knowledge and change its format. Moreover, the curriculum includes teaching strategies which are discovered high level thinking skills of students such as creative thinking, criticizing, analysis, synthesis. In addition, science and technology curriculum recommend to use different kinds of teaching materials such as laboratory equipments, books, visual and audible resources, information and communication technologies (ICTs). Furthermore, differences between traditional and alternative assessment techniques are highlighted in the science and technology curriculum. When the differences are taken into account, there are many kinds of alternative measurement and assessment techniques in the curriculum. These techniques are used to get feedback about students' learning level, to determine their learning needs, to give parents information about learning level of their children, to measure effectiveness of teaching strategies and content of program. Portfolyo, performance and project based assessment, peer and self assessment, presentation, observation, interview are alternative assessment techniques mentioned in science and technology curriculum. Rubric, concept map, V-diagram structured grid, diagnosis branch tests are measurement tools during application of alternative assessment techniques.

The second section of science and technology curriculum, called Learning Area and Units, is examined in three main parts which are seven learning areas, acquisitions, and activity samples.

Organizational structure of science and technology curriculum for learning areas is followed in Table 2.

*Table 2: Organizational Structure of Science and Technology Curriculum for Learning Areas*

| Learning Areas Related to Units | Learning Areas Related to Scientific Literacy |
|---|---|
| 1. Living Things and Life (LTL)<br>2. Matter and Change (MC)<br>3. Physical Events (PE)<br>4. Earth and Universe (EU) | 1. Relations of Science-Technology-Society-Environment (STSE)<br>2. Scientific Process Skills (SPS)<br>3. Attitudes and Values (AV) |

There are units from four learning areas; LTL, MC, PE, and EU to accomplish the vision of the curriculum which is the education of scientifically literate students. These learning areas enable students to gain main principles of science and technology. However, there are no units from three learning areas; STSE, SPS and AV since acquisitions related to these learning areas are gathered with acquisitions and activities of units selected from other learning areas.

# CHAPTER III

# METHODOLOGY

This chapter explains the methods and procedures that are followed in the study aimed to investigate in-service training needs of teachers applying 2004 Science and Technology Curriculum in terms of field and methodology knowledge.. The chapter lists the research design, population and sample of the study, the instrument used for data collection, and the data analysis.

## 3.1. Research Design

Survey studies define existing or existed status without changing conditions and generalize from a sample to a population so that inferences can be made about some characteristics, attitudes or behavior of this population (Creswell, 2003, Karasar, 2009). Data collected from participants by using a questionnaire at the same period of time in this cross-sectional survey study, in which groups of teachers compared with respect of independent variables. It is preferred type of data collection procedure for this survey study because it is an economic design, easy to apply and rapid to collect data. In addition, the most important reason to use survey study and questionnaires is that it explains attributed of a large population from a small group of individuals (Creswell, 2003). So, this survey study aims to define in-service training needs of teachers for 2004 Science and Technology Curriculum by using a questionnaire to make generalization from a group of teachers to those working in Istanbul.

## 3.2. Research Participants

The population of this study included teachers applying 2004 Science and Technology Curriculum from 4th to 8th grades in Istanbul. Cluster sampling design is used in the selection process for participants in the study. This method is ideal one since it is impossible to reach a list of teachers in Istanbul. First of all, a list of primary schools in Istanbul was reached from the official web site of Ministry of National Education. Then, primary schools were selected randomly from this list by cluster sampling. Questionnaire was answered by teachers who applying 2004 Science and Technology Curriculum in the randomly selected primary schools called sample groups.

A stratified random sampling of respondents was made by taking factors developed from research questions into consideration. These are gender (male vs. female), educational background of respondents (to be graduated from educational institutes, training college, undergraduate program, graduate program or doctorate), respondents' faculty of graduation (faculty of education vs. other faculties), respondents' area of specialization (science and technology, physics, chemistry, biology, classroom teachers and others), occupational experience of respondents (0-5 years, 6-10 years, 11-15 years, 16-20 years, 21-25 years, 26 and its over years), and respondents' number of attentions to INSET about 2004 Science and Technology Curriculum prepared by Ministry of National Education (from non to over 3 times).

So, 304 elementary science teachers working in 54 primary state schools in Istanbul were randomly selected as respondents of this survey study. As displayed in Table 3, 64.5% of participants are female teachers (n=196) and rest of those, 35.5%, is male teachers (n=108).

*Table 3: Number and Percentages of Participants According to Gender*

| Gender | Number | Percentage (%) |
|---|---|---|
| Female | 196 | 64.5% |
| Male | 108 | 35.5% |
| Total | 304 | 100% |

## 3.3 Data Collection

The survey instrument designed to collect data for this research study is called "Assessment Scale of Science Teachers' INSET Needs Related to 2004 Science and Technology Curriculum in Terms of Field and Methodology Knowledge".

The process of item development involved four main stages. First of all, 2004 Science and Technology Curriculum from 4$^{th}$ to 8$^{th}$ grades was examined in detail in order to reveal what kinds of knowledge a teacher needed to apply the curriculum. Secondly, an item pool was constructed according to philosophy, aims and acquisitions of the curriculum. Thirdly, items which measure similar needs of teachers were merged in order to decrease number of items. Then, the final version of survey instrument developed with two main forms. While form A looks for demographic characteristics of participants, form B consists of 129 items measuring in-service education and training needs of teachers about 2004 Science and Technology Curriculum. Items in Form B clustered into ten different dimensions. Seven of them are related to learning areas of the curriculum; *Living Things and Life (LTL), Matter and Change (MC), Physical Events (PE), Earth and Universe (EU), Relations of Science-Technology-Society-Environment (STSE), Scientific Process Skills (SPS),* and *Attitudes and Values (AV)*. The other 3 dimensions are related to *general approaches of 2004 Science and Technology Curriculum (GASTC), Science* *and Technology Literacy (STL),* and *Measurement-Assessment Tools and Methods (MATM)*.

Each item in the instrument comprised a statement, which was followed by a five-point Likert scale ranging from strongly not needed (1) to strongly needed (5). Table 4 summarizes the distribution of items according to the dimensions and type of knowledge. Field knowledge includes 92 items with seven dimensions, while methodology knowledge includes 37 items with three dimensions. Totally, both types of knowledge include 129 items with 10 different dimensions.

*Table 4: The Distribution of Items for Each Dimension and Type of Knowledge in Survey Instrument*

| Type of Knowledge | Dimensions | Number of Items |
|---|---|---|
| Field Knowledge | Living Things and Life (LTL) | 20 |
| | Matter and Change (MC) | 14 |
| | Physical Event (PE) | 20 |
| | Earth and Universe (EU) | 12 |
| | Relations of Science-Technology-Society-Environment (STSE) | 9 |
| | Scientific Process Skills (SPS) | 10 |
| | Attitudes and Values (AV) | 7 |
| | Sub-Total | 92 |
| Methodology Knowledge | General Approaches of 2004 Science and Technology Curriculum (GASTC) | 14 |
| | Science and Technology Literacy (STL) | 8 |
| | Measurement-Assessment Tools and Methods (MATM) | 15 |
| | Sub-Total | 37 |
| | TOTAL | 129 |

Reliability of the instrument was established by applying internal consistency (Cronbach Alpha) approach. Cronbach Alpha values and numbers of items for each dimension are shown in Table 5. The alpha values range from 0.942 to 0.992 based on Table 5. Reliability coefficient of the survey instrument is 0.992 which is the highest one among Cronbach Alpha values.

*Table 5: Reliability Coefficients of the Instrument*

| Dimension | Cronbach Alpha | Number of items |
|---|---|---|
| LTL | 0.942 | 12 |
| MC | 0.961 | 20 |
| PE | 0.969 | 22 |
| EU | 0.954 | 12 |
| STSE | 0.960 | 9 |
| SPS | 0.967 | 10 |
| AV | 0.963 | 7 |
| GASTC | 0.955 | 14 |
| STL | 0.974 | 8 |
| MATM | 0.960 | 15 |
| TOTAL | 0.992 | 129 |

Moreover, Cronbach alpha value of STL dimension has the highest reliability coefficient which is 0.974. The second highest coefficient is for PE dimension with 0.969. In addition, reliability coefficient of SPS dimension is 0.967 which is the third highest alpha value among dimensions (in Table 5).

According to Table 5, the number of items for each dimension did not have any significant impact on the reliability index. For instance, the alpha value generated from MC dimension (n=20) is not much different from the alpha value generated from AV dimension (n=7). There are similar situations between the alpha values of SPS (n=10) and PE (n=22) dimensions, between STSE (n=9) and MATM (n=15) dimensions.

### 3.4. Data Analysis

Data coming from the questionnaire were analyzed by using SPSS 16.0 version for Windows. Descriptive and inferential statistics for data analysis were used to get the results of the study and to answer the research questions.

First of all, descriptive statistics were utilized in order to obtain data about characteristics of the participants such as demographic information and teachers' number of attention to INSET planned by Ministry of National Education. The total frequencies and percentages of each characteristic were computed.

Moreover, descriptive statistics were also used to calculate mean scores of science teachers' INSET needs for each item and dimension in the survey instrument. By dividing number of intervals to number of alternatives in Likert scale like 4/5=0.80, point intervals were determined to utilize in evaluation of each item and each dimension. According to this, it was assumed that 1.00-1.79 was the point interval of "strongly not needed" option, 1.80-2.59 was the point interval of "not needed" option, 2.60-3.39 was the point interval of "not sure" option, 3.40-4.19 was the point interval of "needed" option, 4.20-5.00 was the point interval of "strongly needed" option. Furthermore, frequencies and percentages of items in different level of INSET need for each grade in the survey instrument by using descriptive statistics.

In addition, reliability analysis of the survey instrument was established with internal consistency approach. Cronbach alpha values for each dimension and for total survey were calculated.

Finally, inferential statistics were performed to answer some of the research questions. Independent samples t-test was used to determine whether there was a significant difference between level of science teachers' in-service training needs and their gender or marital status and between level of those and their faculty of graduation. Furthermore, analysis of variance F-test was used to find out whether there was a significant difference between INSET needs of science teachers and their occupational experience, their area of specialization, their educational background, and their number of attention to in-service education planned by Ministry of National Education about 2004 Science and Technology Curriculum. Scheffe Post hoc test was used for comparisons of groups in variables since the F-test was not enough to explain which group means were different from one another. Finally, Pearson Product Moment Correlation as inferential statistics was used in order to determine correlations between INSET needs of teachers related to ten different dimensions of the study.

# CHAPTER IV

# FINDINGS

This survey study proposed to determine in-service training needs of science teachers related to field and methodology knowledge of 2004 Science and Technology Curriculum with reference to 10 different dimensions. There are findings about characteristics of participants and INSET needs of participants for field and methodology knowledge in this chapter. In addition, there are findings about INSET needs of science teachers according to acquisitions of the curriculum from $4^{th}$ to $8^{th}$ grade; according to their occupational experience, area of specialization, gender and marital status. It also includes correlations of teachers' INSET needs related to different dimension of the curriculum.

With reference to all dimensions, there is no significant difference between number of attention to in-service training programs planned by Ministry of National Education about 2004 Science and Technology Curriculum and INSET needs of teachers. Similarly, being graduate from faculty of education and educational background of teacher don't have a significant difference with INSET needs of teachers. This means that perceived needs of teachers graduated from faculty of education are similar to perceived needs of those who graduate from other faculties.

## 4.1 Characteristics of Science Teachers Participated in the Study

The demographic data of teachers who participated in this study was summarized from Table 6 to Table 11. 304 teachers (196 female and 108 male) applying 2004 Science and Technology Curriculum were randomly selected as respondents of this survey. Number and percentages of participants according to their educational background are shown in Table 6.

*Table 6: Number and Percentages of Participants According to Their Educational Background*

| Educational Background | Number | Percentage (%) |
|---|---|---|
| Educational Institute | 43 | 14.1% |
| Training College | 30 | 9.9% |
| Undergraduate | 214 | 70.4% |
| Graduate | 14 | 4.6% |
| Doctorate | 1 | .3% |
| Other | 2 | .7% |
| Total | 304 | 100% |

As shown in Table 6, while 70.4% of respondents (n=214) had the degree of bachelor from an undergraduate program of a university, nearly 14% (n=43) and 10% (n=30) of those graduated from respectively educational institutes and training college. Nonetheless, 14 participants whose percentage was 4.6% in the sample group, had the master degree and the rest of them graduated from a doctorate program or out of educational faculty (Table 6).

In addition, number and percentages of participants according to their faculty of graduation were shown in Table 7.

*Table 7: Number and Percentages of Participants According to Their Faculty of Graduation*

| Faculty of Graduation | Number | Percentage (%) |
|---|---|---|
| Faculty of Education | 203 | 66.8% |
| Others | 101 | 33.2% |
| Total | 304 | 100% |

Table 7 shows that 66.8% (n=203) of teachers who participated in this study graduated from faculty of education. However, 33.2% (n=101) of those graduated from faculties which are not educating teachers.

Table 8 demonstrates number and percentages of participants according to their area of specialization.

*Table 8: Number and Percentages of Participants According to Their Area of Specialization*

| Area of Specialization | Number | Percentage (%) |
|---|---|---|
| Science and Technology | 40 | 13.2% |
| Physics | 18 | 5.9% |
| Chemistry | 14 | 4.6% |
| Biology | 9 | 3.0% |
| Classroom teacher | 204 | 67.1% |
| Other | 19 | 6.2% |
| Total | 304 | 100% |

As Table 8 shows that according to teachers' area of specialization analysis, most of the participants (67.1%, n=204) was classroom teachers, 13.2% (n=40) of samples were science and technology teachers. There were18 physics, 14 chemistry, and 9 biology teachers in the research sample group. 19 respondents' specialization was not related to science education.

Number and percentages of participants according to their occupational experience are shown in Table 9.

*Table 9: Number and Percentages of Participants According to Their Occupational Experience*

| Occupational Experience | Number | Percentage (%) |
|---|---|---|
| 0-5 years | 27 | 8.9% |
| 6-10 years | 41 | 13.5% |
| 11-15 years | 104 | 34.2% |
| 16-20 years | 40 | 13.2% |
| 21-25 years | 30 | 9.9% |
| 26 years and over | 62 | 20.4% |
| Total | 304 | 100% |

In Table 9, occupational experience analysis shows that 34.2% of participants, with highest percentage, have been teaching at schools between 11 and 15 years. Teachers experienced 26 years and over have the second highest percentage with 20.4% (n=62) in the sample group. While teachers experienced between 6 and 10 years and between 16 and 20 years have nearly equal percentage, almost 13% for each group, teachers experienced between 0 and 5 years and between 21 and 25 years have respectively 8.9% and 9.9% in research sample group.

Participants' number of attention to INSET program is shown in Table 10.

*Table 10: Number and Percentages of Participants According to Number of Attention to INSET*

| Number of attention to INSET | Number | Percentage (%) |
|---|---|---|
| Non | 170 | 55.9% |
| 1 time | 88 | 28.9% |
| 2 times | 26 | 8.6% |
| 3 times and more | 20 | 6.6% |
| Total | 304 | 100% |

As shown in Table 10, according to analysis of teachers' attention to INSET programs about 2004 Science and Technology Curriculum prepared by Ministry of National Education, more than half of the teachers (55.9%, n=170) who were participated in the survey study have not attended any INSET programs. Nearly 29% of respondents (n=88) participated in to INSET programs only one time. However, a low percentage of those attended to INSET programs for 2 times and 3 times and over (respectively 8.6% and 6.6%).

Number and percentages of participants according to their area of specialization by faculty of graduation and number of attention to INSET are shown in Table 11.

*Table 11: Number and Percentages of Participants According to Their Area of Specialization by Faculty of Graduation and Number of Attention to INSET*

| Area of Specialization | Faculty of Graduation | Number of Attention to INSET | | | | |
|---|---|---|---|---|---|---|
| | | non | 1 time | 2 times | 3 times and over | Total |
| Science and Technology | Faculty of Education | 18 | 11 | 4 | 3 | 36 |
| | | 50.0% | 30.6% | 11.1% | 8.3% | 100.0% |
| | Others | 2 | 1 | 1 | 0 | 4 |
| | | 50.0% | 25.0% | 25.0% | .0% | 100.0% |
| | Sub-total | 20 | 12 | 5 | 3 | 40 |
| | | 50.0% | 30.0% | 12.5% | 7.5% | 100.0% |
| Physics-Chemistry-Biology | Faculty of Education | 8 | 7 | 1 | 4 | 20 |
| | | 40.0% | 35.0% | 5.0% | 20.0% | 100.0% |
| | Others | 12 | 5 | 3 | 1 | 21 |
| | | 57.1% | 23.8% | 14.3% | 4.8% | 100.0% |
| | Sub-total | 20 | 12 | 4 | 5 | 41 |
| | | 48.8% | 29.3% | 9.8% | 12.2% | 100.0% |
| Classroom teacher | Faculty of Education | 72 | 47 | 11 | 9 | 139 |
| | | 51.8% | 33.8% | 7.9% | 6.5% | 100.0% |
| | Others | 46 | 11 | 5 | 3 | 65 |
| | | 70.8% | 16.9% | 7.7% | 4.6% | 100.0% |
| | Sub-total | 118 | 58 | 16 | 12 | 204 |
| | | 57.8% | 28.4% | 7.8% | 5.9% | 100.0% |
| Other | Faculty of Education | 6 | 1 | 1 | 0 | 8 |
| | | 75.0% | 12.5% | 12.5% | .0% | 100.0% |
| | Others | 6 | 5 | 0 | 0 | 11 |
| | | 54.5% | 45.5% | .0% | .0% | 100.0% |
| | Sub-total | 12 | 6 | 1 | 0 | 19 |
| | | 63.2% | 31.6% | 5.3% | .0% | 100.0% |
| Total | Faculty of Education | 104 | 66 | 17 | 16 | 203 |
| | | 51.2% | 32.5% | 8.4% | 7.9% | 100.0% |
| | Others | 66 | 22 | 9 | 4 | 101 |
| | | 65.3% | 21.8% | 8.9% | 4.0% | 100.0% |
| | Total | 170 | 88 | 26 | 20 | 304 |

Most of science and technology teachers (n=36) participated in the study graduated from faculty of education but 4 of those graduated from other faculties of universities. Nonetheless, half of the science and technology teachers (n=20) have never attended to INSET about 2004 Science and Technology Curriculum prepared by Ministry of National Education. In addition, according to Table 11, nearly half of the teachers (n=20) who are specialized in the areas of physics, chemistry, or biology are graduated from faculty of education. 40.0% (n=8) of those have never participated in an INSET program for 2004 Science and Technology Curriculum. The other half of those (n=21) graduated from other faculties. Almost 57% (n=12) of those have not attended any time to an INSET program to apply 2004 Science and Technology Curriculum. The number of classroom teachers, who are teaching science and technology for 4th and 5th grades, is 204. 139 of those are graduated from faculty of education or educational institutes. Approximately 52% (n=72) of those have not been trained and 34% (n=47) of those have been trained one time for 2004 Science and Technology Curriculum. In addition, 65 of classroom teachers graduated from other faculties. Nearly 71% (n=46) of those has not attended to INSET program and almost 17% (n=11) of those were trained just one time for 2004 Science and Technology Curriculum.

Totally, 203 participants graduated from faculty of education and 51.2% (n=104) of those have never attended to INSET program for 2004 Science and Technology Curriculum. Similarly, 65.3% of teachers who graduated from other faculties have never attended INSET program.

Since 2004 Science and Technology Curriculum is a new and different program from previous one, there should have been high INSET need among teachers applying the new curriculum. Although 2004 Science and Technology Curriculum have been applied at all over the primary schools in Turkey since 2005, more than half of the teachers applying the curriculum have never trained for science and technology curriculum.

### 4.2. INSET Needs of Science Teachers about Field Knowledge of Science and Technology Curriculum

This research aimed to find out INSET needs of science teachers related to 2004 Science and Technology Curriculum. In-service training needs of teachers related to field knowledge of Science and Technology Curriculum were assessed in seven dimensions which are Living Things and Life **(LTL)**, Physical Events **(PE)**, Matter and Change **(MC)**, Relations of Science-Technology-Society-Environment **(STSE)**, Attitudes and Values **(AV)**, Scientific Process Skills **(SPS)** and Earth and Universe **(EU)**.

Table 12 summarizes means and levels of INSET needs for each of the seven field knowledge dimensions as perceived by the 304 Turkish teachers applying 2004 Science and Technology Curriculum and participating in this study.

*Table 12: Means and Levels of INSET Needs for Field Knowledge Dimensions*

| Field Knowledge Dimensions | Mean of INSET Needs | Level of INSET Need |
|---|---|---|
| Living Things and Life (LTL) | 2.40 | Not needed |
| Attitudes and Values (AV) | 2.40 | Not needed |
| Earth and Universe (EU) | 2.43 | Not needed |
| Scientific Process Skills (SPS) | 2.47 | Not needed |
| Relations of Science-Technology-Society-Environment (STSE) | 2.54 | Not needed |
| Matter and Change (MC) | 2.57 | Not needed |
| Physical Events (PE) | 2.58 | Not needed |

According to field knowledge dimensions, the highest mean of INSET need is in dimension of Physical Events **(PE)** with 2.58. The dimension of Matter and Change **(MC)** has the second highest mean of INSET need with 2.57. This is followed by Relations of Science-Technology-Society-Environment **(STSE)** dimension with 2.54 mean of INSET need. Table 12 shows that dimensions of Living Things and Life **(LTL)** and Attitudes and Values **(AV)** has the lowest mean of INSET need with 2.40. Means of INSET need related to dimensions of Scientific Process Skills **(SPS)** and Earth and Universe **(EU)** are respectively 2.47 and 2.43.

In Table 12, INSET needs of teachers applying 2004 Science and Technology Curriculum are in the level of "not needed=2" related to all seven dimensions of field knowledge. Table 12 can inferred that Turkish science teachers don't need to improve their knowledge and skills in all seven learning areas of Science and Technology Curriculum.

#### 4.2.1. INSET Needs of Science Teachers Related to Living Things and Life (LTL) Learning Area

INSET needs of science teachers related to the dimension of Living Things and Life Learning Area were assessed with 20 items depending on acquisitions of science and technology curriculum. Item about "Heredity, DNA and genetic diversity" has the highest mean of INSET needs with 3.07. Science teachers participated in the study need in-service training to examine different kinds of cells in microscope with 2.90 mean of INSET need. Item about "Mitosis and meiosis" has the third highest mean of INSET need with 2.82. On the other hand, science teachers have the lowest in-service training about "effects of cigarette and alcohol on human body and society" with 2.01 mean values.

Means and levels of science teachers' INSET needs for LTL Learning Area are shown in Table 13 with items depending on acquisitions of Science and Technology Curriculum. Table 13 displayed that while seven items of LTL Learning Area are valued in "not sure=3" level of INSET need. It means that participants of the study are not sure whether they need INSET about these items which are related to cellular biology and ecology.

*Table 13: Means and Levels of INSET Needs for Living Things and Life (LTL) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 1 | Reproduction and growing in cells, human, animals and plants | 2.25 | Not needed |
| 2 | Classification of living things | 2.09 | Not needed |
| 3 | Examining different kinds of cells in microscope | 2.90 | Not sure |
| 4 | Balanced and healthy nutrition | 2.07 | Not needed |
| 5 | Food chain | 2.13 | Not needed |
| 6 | Carbon, nitrogen and water cycles | 2.61 | Not sure |
| 7 | Skeleton and muscular system | 2.10 | Not needed |
| 8 | Blood circulation system | 2.16 | Not needed |
| 9 | Respiratory system | 2.09 | Not needed |
| 10 | Excretory system | 2.15 | Not needed |
| 11 | Digestion system | 2.11 | Not needed |
| 12 | Nervous and endocrine system | 2.54 | Not needed |
| 13 | Mitosis and meiosis | 2.82 | Not sure |
| 14 | Importance of reproduction with sygamia and agamogony for organisms | 2.74 | Not sure |
| 15 | Heredity, DNA and genetic diversity | 3.07 | Not sure |
| 16 | Biological diversity and ecology | 2.76 | Not sure |
| 17 | Sensorial organs | 2.07 | Not needed |
| 18 | Recycling and renewable energy sources | 2.45 | Not needed |
| 19 | Importance and properties of fungus and microscopic organisms | 2.80 | Not sure |
| 20 | Effects of cigarette and alcohol on human body and society | 2.01 | Not needed |

## 4.2.2. INSET Needs of Science Teachers Related to Matter and Change (MC) Learning Area

Matter and Change (MC) is the second dimension of field knowledge related to Science and Technology Curriculum. There are 14 items for this dimension in order to measure INSET needs of science teachers about Matter and Change Learning Area. Firstly, participants of the study have the highest INSET need to apply acids and bases experiments with 2.93 mean values. This is followed by explaining relations between chemical bounds and chemical reactions with 2.88 mean of INSET need. In the third place, science teachers have INSET needs about "structure of atom and distribution of electrons" with 2.85 mean values. In contrast, teachers have the lowest INSET needs with 2.18 mean values to classify matters (like natural, artificial, manufactured, pure, mixture) and to explain basic properties of solids, liquids and gases with experiments related to dimension of Matter and Change Learning Area.

Means and levels of science teachers' INSET needs for MC Learning Area are shown in Table 14 with items depending on acquisitions of Science and Technology Curriculum. According to Table 14, science teachers are not sure that they need INSET for five items of MC Learning Area which are about inside of matters in chemistry.

*Table 14: Means and Levels of INSET Needs for Matter and Change (MC) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 21 | Structure of atom and distribution of electrons | 2.85 | Not sure |
| 22 | Relations of atom-molecule-element-compound concepts | 2.83 | Not sure |

*Table14 is continuing*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 23 | Explaining differences among physical change, chemical change and change in physical conditions with experiments | 2.53 | Not needed |
| 24 | Classification of matters (like natural, artificial, manufactured, pure, mixture) | 2.18 | Not needed |
| 25 | Explaining basic properties of solids, liquids and gases with experiments | 2.18 | Not needed |
| 26 | Explaining methods of separating mixtures with experiments | 2.23 | Not needed |
| 27 | Energy sources which depends on Sun | 2.43 | Not needed |
| 28 | Calculations, experiments and drawing graphs about heat and temperature | 2.58 | Not needed |
| 29 | Explaining ways of heat dispersion | 2.38 | Not needed |
| 30 | Explaining relations between chemical bounds and chemical reactions | 2.88 | Not sure |
| 31 | Elements in periodic systems | 2.80 | Not sure |
| 32 | Applying acids and bases experiments | 2.93 | Not sure |
| 33 | Applying experiments of mass and volume measurement | 2.38 | Not needed |
| 34 | Determining distinguishing properties of matters with experiments | 2.33 | Not needed |

### 4.2.3. INSET Needs of Science Teachers Related to Physical Events (PE) Learning Area

This study measured in-service training needs of science teachers for the dimension of Physical Events Learning Area with 20 items produced by using acquisitions of science and technology curriculum. First of all, science teachers need in-service training to explain basic properties of mirror and lenses by using experiments with 2.87 mean values. Second highest INSET need of science teachers is about “modeling and using a sundial” with 2.80 mean values. In-service training about “applying spiral spring experiments” is needed thirdly with 2.79 mean values.

Conversely, INSET need of participants about "interpreting graphs of time and distance of mass" is in the lowest mean with 2.25.

Means and levels of science teachers' INSET needs for PE Learning Area are presented in Table 15 with items numbered from 35 to 54.

*Table 15: Means and Levels of INSET Needs for Physical Events (PE) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 35 | Calculating velocity of a mass by measuring distance depending on time | 2.39 | Not needed |
| 36 | Interpreting graphs of time and distance of mass | 2.25 | Not needed |
| 37 | Measuring force by using dynamometer | 2.66 | Not sure |
| 38 | Applying spiral spring experiments | 2.79 | Not sure |
| 39 | Applying buoyant force of liquids and gases experiments | 2.63 | Not sure |
| 40 | Calculating pressure of solid-liquid-gases | 2.75 | Not sure |
| 41 | Explaining simple machine by modeling | 2.73 | Not sure |
| 42 | Transformation of energy from one kind to another | 2.62 | Not sure |
| 43 | Basics of static electricity | 2.56 | Not needed |
| 44 | Dependent variables of resistance for a conductor | 2.53 | Not needed |
| 45 | Parallel and serial electric circuits | 2.57 | Not needed |
| 46 | Measurement of current and voltage of conductors in an electrical circuit | 2.74 | Not sure |
| 47 | Applying optic experiments | 2.75 | Not sure |
| 48 | Applying sound experiments | 2.56 | Not needed |
| 49 | Explaining basic properties of mirror and lenses with experiments | 2.87 | Not sure |
| 50 | Modeling and using a sundial | 2.80 | Not sure |
| 51 | Solar eclipse and lunar eclipse | 2.29 | Not needed |
| 52 | Calculating electrical power | 2.73 | Not sure |
| 53 | Magnets and magnetic field strength of electric current | 2.61 | Not sure |
| 54 | Dependent variables of lamp brightness in an electrical circuit | 2.24 | Not needed |

According to Table 15, 12 of PE Learning Area items are in the level of "not sure=3" while rest of 20 items are valued with "not needed=2" level of INSET need.

As mentioned before that the dimension of Physical Event Learning Area was valued with highest mean of INSET need among seven field knowledge dimensions (Table 12). Therefore, it is normally possible that the number of items in the level of "not sure=3" is much more than those of in the level of "not needed=2" as shown in Table 15. Moreover, Table 15 can be inferred that science teachers are not sure that they need INSET about experiments in physics.

#### 4.2.4. INSET Needs of Science Teachers Related to Earth and Universe (EU) Learning Area

In this research study, Earth and Universe Learning Area with 12 items is another dimension to determine INSET needs of science teachers about field knowledge of science and technology curriculum. Means and levels of science teachers' INSET needs for EU Learning Area are shown in Table 16 with items depending on acquisitions of Science and Technology Curriculum.

*Table 16: Means and Levels of INSET Needs for Earth and Universe (EU) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 55 | Classifying rocks in the Earth crust | 2.43 | Not needed |
| 56 | Erosion and different kinds of soil | 2.13 | Not needed |
| 57 | Formation of earth | 2.31 | Not needed |
| 58 | Solar system and its planets | 2.34 | Not needed |
| 59 | Motion and phases of moon | 2.21 | Not needed |
| 60 | Natural monument of Earth | 2.42 | Not needed |
| 61 | Ground water sources, water of oceans, seas, lakes and rivers | 2.25 | Not needed |
| 62 | Celestial bodies in the space | 2.66 | Not sure |
| 63 | Research studies about space | 2.88 | Not sure |
| 64 | Plate tectonics of Earth crust | 2.65 | Not sure |
| 65 | About meteorological events | 2.55 | Not needed |
| 66 | Classifying layers of earth | 2.34 | Not needed |

As shown in Table16, the highest INSET need in this dimension is related to "research studies about space" with 2.88 mean values. Secondly, science teachers need in-service training about "celestial bodies in the space" with 2.66 mean values. The third highest INSET need in this dimension is related to "plate tectonics of Earth crust" with 2.65 mean values. On the other hand, subject about "erosion and different kinds of soil" is the lowest INSET need for the participants in the dimension of Earth and Universe with 2.13 mean values. Although science teachers don't need INSET about most of the items in EU Learning Area, they are not sure whether they need INSET about plate tectonics of Earth crust, research studies about space and celestial bodies in the space.

### 4.2.5. INSET Needs of Science Teachers Related to Relations of Science-Technology-Society-Environment (STSE) Learning Area

"2004 Science and Technology Curriculum" includes three learning areas which enable students to be scientifically literate while four learning areas (LTL, MC, PE, and EU) in the curriculum are developing scientific knowledge of students. "Relations of Science-Technology-Society-Environment (STSE)" is the first learning area of the curriculum in order to educate students scientifically literate. This study aimed to find out INSET needs of science teachers related to this learning area with 9 items depending on acquisitions of science and technology curriculum.

Means and levels of science teachers' INSET needs for STSE Learning Area are shown in Table 17 with items depending on acquisitions of Science and Technology Curriculum.

*Table 17: Means and Levels of INSET Needs for Relations of Science-Technology-Society-Environment (STSE) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 67 | Understanding nature of science | 2.40 | Not needed |
| 68 | Understanding relation between science and technology | 2.30 | Not needed |
| 69 | Understanding interaction of science and technology with society and environment | 2.30 | Not needed |
| 70 | Strategies applied in solving problems in science and technology | 2.58 | Not needed |
| 71 | Improving critical and responsible attitude towards innovations in science and technology | 2.57 | Not needed |
| 72 | Effects of nature of science and history of science on society | 2.54 | Not needed |
| 73 | Inquiry in scientific processes and technological solutions | 2.67 | Not sure |
| 74 | Improving creative solutions by using science and technology | 2.80 | Not sure |
| 75 | Different points of views about problems in science and technology | 2.71 | Not sure |

In Table 17, with reference to STSE dimension, science teachers have the highest INSET need in "improving creative solutions by using science and technology" with 2.80 mean values. Secondly, participants of the study need in-service training to be aware of different points of views about problems in science and technology with 2.71 mean of INSET need. In addition, they need training to make inquiry in scientific processes and technological solutions with 2.67 mean of INSET need. In contrast, science teachers need training about relation between science-technology and their interaction with society and environment in the lowest mean of INSET need with 2.30.

Moreover, table 17 displayed that most of STSE Learning Area items are valued with "not needed=2" level of INSET need while three of them are in "not sure=3" level of INSET need. Teachers are not sure that they need INSET for "making inquiry in science, being aware of different points of views about problems, and improving creative solutions."

4.2.6. INSET Needs of Science Teachers Related to Scientific Process Skills (SPS) Learning Area

"Scientific Process Skills (SPS)" is the second learning area of Science and Technology Curriculum in order to develop scientific literacy of students. This research study proposed to determine INSET needs of science teachers about supporting students to develop their scientific process skills with 10 items depending on acquisitions of the curriculum. Means and levels of science teachers' INSET needs for SPS Learning Area are shown in Table 18 with items depending on acquisitions of Science and Technology Curriculum.

*Table 18: Means and Levels of INSET Needs for Scientific Process Skills (SPS) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 76 | Supporting student for observation | 2.54 | Not needed |
| 77 | Supporting students for making comparison and implication after observation | 2.54 | Not needed |
| 78 | Supporting students for predicting depended on observation and implication | 2.43 | Not needed |
| 79 | Supporting students for determining variables of an experiment | 2.50 | Not needed |
| 80 | Supporting students for hypothesizing with determined variables | 2.64 | Not sure |
| 81 | Supporting students for making experiments | 2.47 | Not needed |
| 82 | Supporting students for collecting and recording data | 2.44 | Not needed |
| 83 | Supporting students for making graphs depended on data | 2.41 | Not needed |
| 84 | Supporting students for interpreting and inferring data | 2.42 | Not needed |
| 85 | Supporting students for presentation of findings | 2.36 | Not needed |

According to SPS dimension, science teachers have the highest INSET need in “supporting students for hypothesizing with determined variables” with 2.64 mean values. Secondly, participants of the study need in-service training to support students for observation and for making comparison and implication after observation with 2.54 mean of INSET need. Moreover, they need training to support students for determining variables of an experiment with 2.50 mean of INSET need. Conversely, science teachers need training about supporting students for presentation of findings in the lowest mean of INSET need with 2.36.

Table 18 displayed that most of SPS Learning Area items are valued with “not needed=2” level of INSET need while only one of them is in “not sure=3” level of INSET need. It means that science teachers don’t need INSET to support students for scientific process skills. On the other hand, they are not sure whether they need INSET to support students for hypothesizing which is an important step of scientific process skills.

### 4.2.7. INSET Needs of Science Teachers Related to Attitudes and Values (AV) Learning Area

“Attitudes and Values (AV)” is the last learning area of Science and Technology Curriculum in order to develop scientific literacy of students. Determining INSET needs of science teachers related to Attitudes and Values Learning Area with 7 items is one of the aims of this study. Means and levels of science teachers’ INSET needs for AV Learning Area are shown in Table 19 with items depending on acquisitions of Science and Technology Curriculum

*Table 19: Means and Levels of INSET Needs for Attitudes and Values (AV) Learning Area*

| Item No | Items Depending on Acquisitions of Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 86 | Measuring attitudes of students related to science and technology | 2.43 | Not needed |
| 87 | Improving attitudes and values related to benefits of scientific and technological knowledge for individual, society and environment | 2.37 | Not needed |
| 88 | Supplying students to perceive what is happening in their environment | 2.36 | Not needed |
| 89 | Supplying students to react in a proper and positive way for a situation | 2.37 | Not needed |
| 90 | Supplying students to improve positive values about objects and events | 2.37 | Not needed |
| 91 | Supplying students to organize values developed by themselves in their self-esteem | 2.46 | Not needed |
| 92 | Supplying students to improve a life style including positive attitudes and values | 2.42 | Not needed |

In table 19, the highest INSET need of teachers in this dimension is related to "supplying students to organize values developed by themselves in their self-esteem" with 2.46 mean values. On the other hand, the lowest INSET need of those in this dimension is about "Supplying students to perceive what is happening in their environment" with 2.36 mean values. All AV Learning Area items are valued with "not needed=2" which means that science teachers don't need INSET about AV Learning Area.

### 4.3. INSET Needs of Science Teachers about Methodology Knowledge of Science and Technology Curriculum

The current study examines in-service training needs of science teachers according to methodology knowledge of science and technology curriculum with three different dimensions in addition to field knowledge of Science and Technology Curriculum with seven learning area dimensions. In-service training needs of teachers related to methodology knowledge of the curriculum were assessed in three dimensions which are General Approaches of 2004 Science and Technology Curriculum **(GASTC)**, Science and Technology Literacy **(STL)**, and Measurement-Assessment Tools and Methods **(MATM)**. Means and levels of science teachers' INSET needs for each of the three methodology knowledge dimensions are shown in Table 20.

*Table 20: Means and Levels of INSET Needs for Methodology Knowledge Dimensions*

| Methodology Knowledge Dimensions | Mean of INSET Needs | Level of INSET Needs |
|---|---|---|
| Science and Technology Literacy (STL) | 2.46 | Not needed |
| Measurement-Assessment Tools and Methods (MATM) | 2.50 | Not needed |
| General Approaches of 2004 Science and Technology Curriculum (GASTC) | 2.58 | Not needed |

According to methodology knowledge dimensions, the highest mean of INSET need is in dimension of General Approaches of 2004 Science and Technology Curriculum **(GASTC)** with 2.58. This is followed by Measurement-Assessment Tools and Methods **(MATM)** dimension with 2.50 mean values. Science and Technology Literacy **(STL)** dimension is the lowest mean of need with 2.46 mean values (in Table 20).

INSET needs of teachers applying 2004 Science and Technology Curriculum are in the level of "not needed=2" related to all three methodology knowledge dimensions. This means that Turkish science teachers don't need to develop their knowledge and skills in all three methodology dimensions of Science and Technology Curriculum.

### 4.3.1. INSET Needs of Science Teachers Related to General Approaches of 2004 Science and Technology Curriculum (GASTC)

Methodology knowledge of science and technology curriculum contains three dimensions in this study. The first dimension called General Approaches of 2004 Science and Technology Curriculum (GASTC) includes philosophy and vision of the curriculum, technology dimension of science, and purposes of the curriculum. In this context, this study aimed to determine INSET needs of science teachers related to general approaches of the curriculum with 14 items. Means and levels of science teachers' INSET needs for GASTC are shown in Table 21 with items depending on Science and Technology Curriculum.

*Table 21: Means and Levels of INSET Needs for General Approaches of 2004 Science and Technology Curriculum (GASTC)*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 93 | Fundamental philosophy of 2004 Science and Technology Curriculum | 2.53 | Not needed |
| 94 | Vision, purposes and targets of 2004 Science and Technology Curriculum | 2.55 | Not needed |
| 95 | Differences between 2002 Science Curriculum and 2004 Science and Technology Curriculum | 2.58 | Not needed |
| 96 | Applying spiral principle of 2004 Science and Technology Curriculum | 2.64 | Not sure |
| 97 | Making relation of science and technology course with other disciplinary and courses | 2.46 | Not needed |
| 98 | Planning instruction according to individual differences of students | 2.51 | Not needed |
| 99 | Organizing proper instructional medium for students needed special education | 2.85 | Not sure |
| 100 | Teaching science and technology with constructivism | 2.56 | Not needed |
| 101 | Teaching strategies which reveal higher thinking skills of students | 2.83 | Not sure |
| 102 | Qualities of homework given to students | 2.44 | Not needed |

*Table21 is continuing*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 103 | Supplying students to gain knowledge and skills which are necessary for security in science laboratory | 2.53 | Not needed |
| 104 | Knowing and using science laboratory equipments | 2.69 | Not sure |
| 105 | Using different materials, audio-visual resources, computer, and other technological equipments during science and technology instruction | 2.64 | Not sure |
| 106 | Making relation of science subjects with daily life during instruction | 2.29 | Not needed |

With reference to GASTC dimension, the highest INSET need of science teachers is related to organize proper instructional medium for students needed special education with 2.85 mean values. Secondly, participants of the study need in-service training to be aware of teaching strategies which reveal higher thinking skills of students with 2.83 mean of INSET need. Moreover, they need training to know and use science laboratory equipments with 2.69 mean of INSET need. On the other hand, INSET about "making relation of science subjects with daily life during instruction" is the lowest mean of science teachers' needs with 2.29 (in Table 21).

As shown in Table 21, it can be inferred that science teachers don't need INSET about general approaches of the curriculum. On the other hand, they are not sure whether they need INSET about applying spiral principle of the curriculum, organizing instructional medium, using lab equipments and technological materials.

### 4.3.2. INSET Needs of Science Teachers Related to Science and Technology Literacy (STL)

Since science and technology literacy is a fundamental issue in the curriculum, this research study aimed to find out INSET needs of science teachers related to the dimension of Science and Technology Literacy (STL) with 8 items depending on the curriculum. Means and levels of science teachers' INSET needs for Science and Technology Literacy dimension are shown in Table 22.

*Table 22: Means and Levels of INSET Needs for Science and Technology Literacy (STL)*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 107 | Directing students to scientific research | 2.50 | Not needed |
| 108 | Directing students to inquiry | 2.42 | Not needed |
| 109 | Directing students to critical thinking | 2.43 | Not needed |
| 110 | Directing students to solve problem | 2.41 | Not needed |
| 111 | Directing students to make decisions | 2.39 | Not needed |
| 112 | Directing students to lifelong learning | 2.43 | Not needed |
| 113 | Developing activities to increase self-confidence of students related to science | 2.55 | Not needed |
| 114 | Developing activities to increase motivations of students related to science | 2.52 | Not needed |

According to Science and Technology (STL) dimension, INSET about "developing activities to increase self-confidence of students related to science" is the highest mean of science teachers' needs with 2.55 mean values. This is followed by "developing activities to increase motivations of students related to science" with 2.52 mean of INSET need. Thirdly, science teachers need INSET about "directing students to scientific research" with 2.50 mean values. However, training about "directing students to make decisions" is necessary for participants of the study in 2.39 mean of INSET need (in Table 22).

As shown in Table 22, INSET needs of teachers applying 2004 Science and Technology Curriculum are in the level of "not needed=2" related to all items which means that they don't need INSET about the dimension of Science and Technology Literacy.

### 4.3.3. INSET Needs of Science Teachers Related to Measurement-Assessment Tools and Methods (MATM)

The dimension of Measurement-Assessment Tools and Methods is the last methodology knowledge of science and technology curriculum in this study. This dimension contains 15 items related to alternative assessment techniques and tools applied in the curriculum. Means and levels of science teachers' INSET needs for MATM dimension are shown in Table 23 with items depending on Science and Technology Curriculum.

*Table 23: Means and Levels of INSET Needs for Measurement-Assessment Tools and Methods (MATM)*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 115 | Differences about alternative and traditional measurement and assessment techniques | 2.59 | Not needed |
| 116 | Using rubrics in assessment and measurement of students | 2.69 | Not sure |
| 117 | Assessing students' behavior by observation | 2.35 | Not needed |
| 118 | Assessing students with their oral presentations | 2.23 | Not needed |
| 119 | Assessing students' project depended on scientific research | 2.45 | Not needed |
| 120 | Giving directions to students in peer assessment | 2.38 | Not needed |
| 121 | Assessing students by using portfolios | 2.33 | Not needed |
| 122 | Improving activities in the process of performance assessment of students | 2.40 | Not needed |
| 123 | Assessing students by using concept maps | 2.44 | Not needed |

*Table 23 is continuing*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 124 | Using V-diagram in assessing students | 2.93 | Not sure |
| 125 | Using structured grid in assessing students | 3.00 | Not sure |
| 126 | Using diagnosis branches tests in assessing students | 2.88 | Not sure |
| 127 | Writing proper questions for acquisitions of curriculum | 2.29 | Not needed |
| 128 | Preparing proper answer key for assessment and measurement tools | 2.27 | Not needed |
| 129 | Evaluating data obtained from measurement tools | 2.33 | Not needed |

With reference to this dimension, the highest INSET need of science teachers is related to use of structured grid in assessing students with 3.00 mean values. Secondly, participants of the study need in-service training to use of V-diagram in assessing students with 2.93 mean of INSET need. In addition, they need training to use of diagnosis branches tests in assessing students with 2.88 mean of INSET need. Conversely, INSET about "assessing students with their oral presentations" is the lowest mean of science teachers' needs with 2.23 (in Table 23).

Table 23 displayed that most of MATM items are valued with "not needed=2" level of INSET need while four of them are in "not sure=3" level of INSET need. The items valued in "not sure=3" level of INSET need are all related to some alternative assessment tools which are rubrics, V-diagrams, structured grids, and diagnosis branches tests.

## 4.4. INSET Needs of Science Teachers from 4th to 8th Grades According to Acquisitions of Science and Technology Curriculum

Acquisitions of 2004 Science and Technology Curriculum are distributed from 4th to 8th grade according to spiral principle of the curriculum. This research study aimed to find out INSET needs of science teachers with reference to grades of acquisitions. Therefore, survey of the study includes different numbers of items for each grade as shown in Table 24.

*Table 24: Number of Items, Mean and Level of INSET Needs for Each Grade*

| Grade of items | Number of items | Mean of INSET Needs | Level of INSET Needs |
|---|---|---|---|
| 4 | 17 | 2.40 | Not needed |
| 5 | 20 | 2.38 | Not needed |
| 6 | 19 | 2.41 | Not needed |
| 7 | 22 | 2.58 | Not needed |
| 8 | 19 | 2.65 | Not sure |

The highest INSET need of science teachers is for subjects of 8th grade with 2.65 mean values. Moreover, INSET about subjects of 7th grade is the second highest need of science teachers. On the other hand, they need INSET about subjects of 5th grade with lowest mean value. Table 24 shows level of INSET needs of science teachers for each grade in addition to the number of items and mean of INSET needs for each grade. According to that table, INSET need of science teachers for 8th grade is in the level of “not sure=3” while INSET needs of those for other grades are in the level of “not needed=2”. It can be inferred that science teachers are not sure that they need INSET for 8th grade subjects.

Number and percentage of items in “not needed=2” and “not sure=3” level of INSET need for each grade are shown in Table 25.

*Table 25: Number and Percentage of Items in "Not Needed" and "Not Sure" Level of INSET Need*

| Grade | Number of items related to for each grade | Number of items in the "not needed" level | Percentage of items in the "not needed" level | Number of items in the "not sure" level | Percentage of items in the "not sure" level |
|---|---|---|---|---|---|
| 4 | 17 | 14 | 82.35 | 3 | 17.65 |
| 5 | 20 | 15 | 75.00 | 5 | 25.00 |
| 6 | 19 | 15 | 78.95 | 4 | 21.05 |
| 7 | 22 | 9 | 40.91 | 11 | 50.00 |
| 8 | 19 | 6 | 31.58 | 13 | 68.42 |

According to Table 25, nearly 68% of items related to subjects of 8th grade are in the "not sure=3" level. Moreover, 50% of items for 7th grade are in the "not sure=3" level of INSET need. In contrast, most of the items for 4th, 5th and 6th grade are in not needed level of INSET need. This means that INSET need of science teachers participated in this study is higher for subjects of 7th and 8th grade than those of 4th, 5th and 6th grade in Science and Technology Curriculum.

### 4.4.1. INSET Needs of Science Teachers for Subjects of 4th Grade in 2004 Science and Technology Curriculum

INSET needs of science teachers for subjects of 4th grade in Science and Technology Curriculum were assessed with 17 items depending on acquisitions of the curriculum. Means and levels of INSET needs for subjects of 4th grade in the Curriculum are presented in Table 26.

*Table 26: Means and Levels of INSET Needs for Subjects of 4th Grade in 2004 Science and Technology Curriculum*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 3 | Examining different kinds of cells in microscope | 2.90 | Not sure |
| 7 | Skeleton and muscular system | 2.10 | Not needed |
| 8 | Blood circulation system | 2.16 | Not needed |

*Table 26 is continuing*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 9 | Respiratory system | 2.09 | Not needed |
| 18 | Recycling and renewable energy sources | 2.45 | Not needed |
| 19 | Importance and properties of fungus and microscopic organisms | 2.80 | Not sure |
| 23 | Explaining differences among physical change, chemical change and change in physical conditions with experiments | 2.53 | Not needed |
| 24 | Classification of matters (like natural, artificial, manufactured, pure, mixture) | 2.18 | Not needed |
| 25 | Explaining basic properties of solids, liquids and gases with experiments | 2.18 | Not needed |
| 26 | Explaining methods of separating mixtures with experiments | 2.23 | Not needed |
| 33 | Applying experiments of mass and volume measurement | 2.38 | Not needed |
| 45 | Parallel and serial electric circuits | 2.57 | Not needed |
| 47 | Applying optic experiments | 2.75 | Not sure |
| 48 | Applying sound experiments | 2.56 | Not needed |
| 55 | Classifying rocks in the crust of Earth | 2.43 | Not needed |
| 56 | Erosion and different kinds of soil | 2.13 | Not needed |
| 66 | Classifying layers of earth | 2.34 | Not needed |

First of all, training about "examining different kinds of cells in microscope" is the highest mean of INSET needs with 2.90. This is followed by "importance and properties of fungus and microscopic organisms" with 2.80 mean of INSET need. Thirdly, participants of the study need INSET to apply optic experiments with 2.75 mean values. INSET needs about these items are in the level of "not sure=3". Conversely, INSET needs about rest of those are in the level of "not needed=2". For instance, INSET needs of participants about respiratory system are in the lowest mean and in the level of "not needed". Therefore, the number of items in the level of "not sure=3" is less than those of in the level of "not needed=2" as shown in Table26.

### 4.4.2. INSET Needs of Science Teachers for Subjects of 5th Grade in 2004 Science and Technology Curriculum

This research study proposed to measure INSET needs of science teachers for subjects of 5th grade in Science and Technology Curriculum with 20 items depending on acquisitions of the curriculum. Means and levels of INSET needs for subjects of 5th grade in the curriculum are presented in Table 27.

*Table 27: Means and Levels of INSET Needs for Subjects of 5th Grade in 2004 Science and Technology Curriculum*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 2 | Classification of living things | 2.09 | Not needed |
| 4 | Balanced and healthy nutrition | 2.07 | Not needed |
| 5 | Food chain | 2.13 | Not needed |
| 10 | Excretory system | 2.15 | Not needed |
| 11 | Digestion system | 2.11 | Not needed |
| 19 | Importance and properties of fungus and microscopic organisms | 2.80 | Not sure |
| 20 | Effects of cigarette and alcohol on human body and society | 2.01 | Not needed |
| 23 | Explaining differences among physical change, chemical change and change in physical conditions with experiments | 2.53 | Not needed |
| 27 | Energy sources which depends on Sun | 2.43 | Not needed |
| 28 | Calculations, experiments and drawing graphs about heat and temperature | 2.58 | Not needed |
| 34 | Determining distinguishing properties of matters with experiments | 2.33 | Not needed |
| 45 | Parallel and serial electric circuits | 2.57 | Not needed |
| 47 | Applying optic experiments | 2.75 | Not sure |
| 48 | Applying sound experiments | 2.56 | Not needed |

*Table 27 is continuing*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 50 | Modeling and using a sundial | 2.80 | Not sure |
| 51 | Solar eclipse and lunar eclipse | 2.29 | Not needed |
| 53 | Magnets and magnetic field  strength of electric current | 2.61 | Not sure |
| 54 | Dependent variables of lamp brightness in an electrical circuit | 2.24 | Not needed |
| 58 | Solar system and its planets | 2.34 | Not needed |

INSET about "importance and properties of fungus and microscopic organisms" and "modeling and using a sundial" is the highest need of science teachers participated in this study with 2.80 mean values. In addition, they need training to apply optic experiments with 2.75 mean values. Furthermore, training need of teachers about "magnets and magnetic field strength of electric current" is in 2.61 mean values. INSET needs about these items are in the level of "not sure=3". However, INSET need level of science teachers for other subjects of 5$^{th}$ grade is "not needed=2" Similarly, they need training for "effects of cigarette and alcohol on human body and society" in the lowest mean and in the level of "not needed". As shown in Table 27, the number of items in the level of "not sure=3" is less than those of in the level of "not needed=2"

### 4.4.3. INSET Needs of Science Teachers for Subjects of 6$^{th}$ Grade in 2004 Science and Technology Curriculum

There are 19 items related to subjects of 6$^{th}$ grade in Science and Technology Curriculum to assess INSET needs of science teachers. Means and levels of INSET needs for subjects of 6$^{th}$ grade in the curriculum are presented in Table 28.

*Table 28: Means and Levels of INSET Needs for Subjects of 6th Grade in 2004 Science and Technology Curriculum*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 1 | Reproduction and growing in cells, human, animals and plants | 2.25 | Not needed |
| 7 | Skeleton and muscular system | 2.10 | Not needed |
| 8 | Blood circulation system | 2.16 | Not needed |
| 9 | Respiratory system | 2.09 | Not needed |
| 22 | Relations of atom-molecule-element-compound concepts | 2.83 | Not sure |
| 23 | Explaining differences among physical change, chemical change and change in physical conditions with experiments | 2.53 | Not needed |
| 24 | Classification of matters (like natural, artificial, manufactured, pure, mixture) | 2.18 | Not needed |
| 29 | Explaining ways of heat dispersion | 2.38 | Not needed |
| 35 | Calculating velocity of a mass by measuring distance depending on time | 2.39 | Not needed |
| 36 | Interpreting graphs of time and distance of mass | 2.25 | Not needed |
| 37 | Measuring force by using dynamometer | 2.66 | Not sure |
| 44 | Dependent variables of resistance for a conductor | 2.53 | Not needed |
| 47 | Applying optic experiments | 2.75 | Not sure |
| 48 | Applying sound experiments | 2.56 | Not needed |
| 49 | Explaining basic properties of mirror and lenses with experiments | 2.87 | Not sure |
| 55 | Classifying rocks in the crust of Earth | 2.43 | Not needed |
| 56 | Erosion and different kinds of soil | 2.13 | Not needed |
| 60 | Natural monument of Earth | 2.42 | Not needed |
| 61 | Ground water sources, water of oceans, seas, lakes and rivers | 2.25 | Not needed |

The highest INSET need of science teachers about subjects of 6th grade is to explain basic properties of mirror and lenses by using experiments with 2.87 mean values. The second highest training need is about "relations of atom-molecule-element-compound concepts" with 2.83 mean of INSET need. Thirdly, science teachers need INSET to apply optic experiments with 2.75 mean values like INSET need in the 4th and 5th grade. Science teachers are not sure whether they need INSET about these items. In contrast, participants of the study don't need INSET about respiratory system with the lowest mean of INSET need like in the 4th grade. INSET needs about rest of the items are in the level of "not needed=2". Therefore, the number of items in the level of "not sure=3" is less than those of in the level of "not needed=2" as shown in Table 28.

### 4.4.4. INSET Needs of Science Teachers for Subjects of 7th Grade in 2004 Science and Technology Curriculum

INSET needs of science teachers for subjects of 7th grade in 2004 Science and Technology Curriculum were measured with 22 items in the survey of this study. Means and levels of INSET needs for subjects of 7th grade in the curriculum are presented in Table 29.

*Table 29: Means and Levels of INSET Needs for Subjects of 7th Grade in 2004 Science and Technology Curriculum*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 5 | Food chain | 2.13 | Not needed |
| 10 | Excretory system | 2.15 | Not needed |
| 11 | Digestion system | 2.11 | Not needed |
| 12 | Nervous and endocrine system | 2.54 | Not needed |
| 16 | Biological diversity and ecology | 2.76 | Not sure |
| 17 | Sensorial organs | 2.07 | Not needed |
| 21 | Structure of atom and distribution of electrons | 2.85 | Not sure |
| 22 | Relations of atom-molecule-element-compound concepts | 2.83 | Not sure |
| 24 | Classification of matters (like natural, artificial, manufactured, pure, mixture) | 2.18 | Not needed |

*Table 29 is continuing*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 30 | Explaining relations between chemical bounds and chemical reactions | 2.88 | Not sure |
| 31 | Elements in periodic systems | 2.80 | Not sure |
| 38 | Applying spiral spring experiments | 2.79 | Not sure |
| 41 | Explaining simple machine by modeling | 2.73 | Not sure |
| 42 | Transformation of energy from one kind to another | 2.62 | Not sure |
| 43 | Basics of static electricity | 2.56 | Not needed |
| 45 | Parallel and serial electric circuits | 2.57 | Not needed |
| 46 | Measurement of current and voltage of conductors in an electrical circuit | 2.74 | Not sure |
| 47 | Applying optic experiments | 2.75 | Not sure |
| 49 | Explaining basic properties of mirror and lenses with experiments | 2.87 | Not sure |
| 58 | Solar system and its planets | 2.34 | Not needed |
| 62 | Celestial bodies in the space | 2.66 | Not sure |
| 63 | Research studies about space | 2.88 | Not sure |

According to Table 29, INSET related to "research studies about space" and "explaining relations between chemical bounds and chemical reactions" is the highest need of science teachers with 2.88 mean values. This is followed by training to explain basic properties of mirror and lenses by using experiments with 2.87 mean values like in the subjects of 6$^{th}$ grade. Moreover, the third highest INSET need of participants is related to "structure of atom and distribution of electrons" with 2.85 mean values. Participants of the study are not sure that they need INSET about these items. Conversely, science teachers don't need training for "sensorial organs" with lowest mean of INSET need.

As shown in Table 29, the number of items in the level of "not sure=3" is more than those of in the level of "not needed=2". Therefore, the number of subjects needed INSET for 7th grade is more than the number of those for each 4th, 5th and 6th grade.

### 4.4.5. INSET Needs of Science Teachers for Subjects of 8th Grade in 2004 Science and Technology Curriculum

This research study aimed to find out INSET needs of science teachers applying 2004 Science and Technology Curriculum for subjects of 8th grade with 19 items depending on acquisitions of the curriculum. Means and levels of INSET needs for subjects of 8th grade in the curriculum are presented in Table 30.

*Table 30: Means and Levels of INSET Needs for Subjects of 8th Grade in 2004 Science and Technology Curriculum*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 5 | Food chain | 2.13 | Not needed |
| 6 | Carbon, nitrogen and water cycles | 2.61 | Not sure |
| 13 | Mitosis and meiosis | 2.82 | Not sure |
| 14 | Importance of reproduction with sygamia and agamogony for organisms | 2.74 | Not sure |
| 15 | Heredity, DNA and genetic diversity | 3.07 | Not sure |
| 18 | Recycling and renewable energy sources | 2.45 | Not needed |
| 23 | Explaining differences among physical change, chemical change and change in physical conditions with experiments | 2.53 | Not needed |
| 28 | Calculations, experiments and drawing graphs about heat and temperature | 2.58 | Not needed |
| 30 | Explaining relations between chemical bounds and chemical reactions | 2.88 | Not sure |
| 31 | Elements in periodic systems | 2.80 | Not sure |
| 32 | Applying acids and bases experiments | 2.93 | Not sure |

*Table 30 is continuing*

| Item No | Items Depending on Science and Technology Curriculum | Mean of INSET Needs | Level of INSET Need |
|---|---|---|---|
| 39 | Applying buoyant force of liquids and gases experiments | 2.63 | Not sure |
| 40 | Calculating pressure of solid-liquid-gases | 2.75 | Not sure |
| 42 | Transformation of energy from one kind to another | 2.62 | Not sure |
| 52 | Calculating electrical power | 2.73 | Not sure |
| 53 | Magnets and magnetic field strength of electric current | 2.61 | Not sure |
| 57 | Formation of earth | 2.31 | Not needed |
| 64 | Heaves of earth crust | 2.65 | Not sure |
| 65 | About meteorological events | 2.55 | Not needed |

Table 30 shows that INSET about “heredity, DNA and genetic diversity” is the highest need of science teachers participated in this study. While mean value of this need is 3.07, it is the highest INSET need of whole study. Secondly, participants of the study need INSET to apply acids and bases experiments with 2.93 mean values. Thirdly, they need training to explain relations between chemical bounds and chemical reactions with 2.88 mean values like in subjects of 7$^{th}$ grade. Science teachers in this study are not sure that they need training for these items. In contrast, they don’t need INSET about food chain with the lowest mean of INSET need. Table 30 shows that the number of items in the level of “not sure=3” is more than those of in the level of “not needed=2”. So, the number of subjects needed INSET for 8$^{th}$ grade is more than the number of those for each 4$^{th}$, 5$^{th}$, 6$^{th}$ and 7$^{th}$ grade. This can explained that the highest INSET need of science teachers is for subjects of 8$^{th}$ grade in 2004 Science and Technology Curriculum

## 4.5. INSET Needs of Science Teachers According to Their Occupational Experience

This research study aimed to determine relationship between in-service training needs of science teachers and their occupational experience of science teachers. In order to accomplish it, participants of the study were divided in to three different groups according to their occupational experiences which are between 0-5 years, between 6-15 years, 16 years and over.

### 4.5.1. Means and Levels of Three Different Occupational Experience Groups' INSET Need for Each Dimension

Means and levels of three different occupational experience groups' INSET need for each dimension are demonstrated in Table 31.

*Table 31: Means and Levels of Three Occupational Experience Groups' INSET Need for Each Dimension*

| DIMENSIONS | OCCUPATIONAL EXPERIENCE | | | | | |
|---|---|---|---|---|---|---|
| | 0-5 years | | 6-15 years | | 16 years and over | |
| | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need |
| LTL | 2.196 | Not needed | 2.503 | Not needed | 2.320 | Not needed |
| MC | 2.176 | Not needed | 2.668 | Not sure | 2.535 | Not needed |
| PE | 2.298 | Not needed | 2.705 | Not sure | 2.502 | Not needed |
| EU | 2.355 | Not needed | 2.559 | Not needed | 2.302 | Not needed |
| STSE | 2.300 | Not needed | 2.608 | Not sure | 2.515 | Not needed |
| SPS | 2.274 | Not needed | 2.526 | Not needed | 2.458 | Not needed |
| AV | 2.280 | Not needed | 2.427 | Not needed | 2.386 | Not needed |
| GASTC | 2.310 | Not needed | 2.666 | Not sure | 2.538 | Not needed |
| STL | 2.181 | Not needed | 2.516 | Not needed | 2.449 | Not needed |
| MATM | 2.165 | Not needed | 2.565 | Not needed | 2.504 | Not needed |
| TOTAL MEAN | 2.254 | Not needed | 2.574 | Not needed | 2.451 | Not needed |

According to Table 31, science teachers experienced between 6 and 15 years have the highest INSET need about 2004 Science and Technology Curriculum with 2.57 mean values. Furthermore, 16 and over years experienced teachers have the second highest INSET need with 2.45 mean values while between 0 and 5 years experienced teachers need INSET with lowest mean. Science teachers in all three groups differentiated by occupational experience don't need INSET about the curriculum. Table 31 also shows means and levels of INSET need in each group according to dimensions of this study. Participants of this study experienced between 0-5 years or 16 years and over don't need training for ten dimensions. However, teachers in the group of between 6 and 15 years occupational experience are not sure whether they need INSET for the dimension of MC, PE, STSE and GASTC

Teachers in the group of between 0-5 years occupational experience have the highest INSET need for the dimension of GASTC. Similarly, teacher who have experience over 15 years need INSET about GASTC in the highest mean. On the other hand, between 6-15 year experienced teachers need training for PE dimension with the highest mean.

### 4.5.2. Significance Level of Differences between Occupational Experience of Teachers and Their INSET Needs

In this research study, significance level of differences between occupational experience of teachers and their INSET needs related to 2004 Science and Technology Curriculum was determined by using analysis of variance F-test. The F-values and significance levels of differences for each dimension are shown in Table 32 ($p < 0.05$).

*Table 32: Significance Level of Differences between Occupational Experience of Teachers and Their INSET Needs Related to Each Dimension*

| Dimensions | F-values | p |
|---|---|---|
| LTL | 2.621 | .074 |
| MC | 3.505 | .031* |
| PE | 3.365 | .036* |
| EU | 3.190 | .043* |
| STSE | 1.309 | .272 |
| SPS | .839 | .433 |
| AV | .293 | .747 |
| GASTC | 2.227 | .110 |
| STL | 1.402 | .248 |
| MATM | 2.646 | .073 |
| Total Mean | 2.722 | .067 |

*significant at p<0.05

According to Table 32, there is no significant difference between INSET needs of teachers and their occupational experience in total mean. However, there is significant difference between occupational experience of teachers and means of their INSET needs related MC, PE, and EU dimensions ($p<0.05$). Table 32 shows that Matter and Change (MC) dimension reveals the highest significance level of difference between teachers' INSET need and their occupational experience ($F=3.505$; $p=0.031$). Secondly, there is also a significant difference between INSET needs and occupational experience of science teachers in the Physical Events (PE) dimension ($F=3.365$; $p=0.036$). Finally, in the Earth and Universe (EU) dimension, significant difference exists between INSET needs of teachers and their experience in teaching science ($F=3.190$; $p=0.043$). Therefore, it could be inferred that science teachers from different occupational experience groups have different INSET needs in dimensions of MC, PE and EU.

Although analysis of variance F-test shows that there are significant differences between science teachers' INSET need related to the curriculum and their experience in teaching science, this test does not indicate which group means are different. In order to accomplish this, Scheffe post hoc multiple comparisons were used between groups and its significant results are shown in Table 33.

*Table 33: Significance Level of Differences between Occupational Experience Groups for INSET Needs of Teachers According to Post Hoc Test Results*

| Dimensions | Occupational Experience Groups | p |
|---|---|---|
| MC | 0-5 years/6-15 years | .036** |
| EU | 6-15 years/16 years and over | .047** |

**significant at p<0.05

Scheffe test implies that between 0 and 5 years and between 6 and 15 years of experienced teachers' mean of INSET needs significantly differentiated in MC dimension ($p=0.036$ at $p< 0.05$) while between 6 and 15 years and between 16 and over 25 years of experienced teachers' mean of INSET needs have a significant difference in EU dimension ($p=0.047$ at $p<0.05$).

## 4.6. INSET Needs of Science Teachers According to Their Area of Specialization

This study proposed to find out whether the level of in-service training needs of science teachers for 2004 Science and Technology Curriculum is related to their area of specialization. Therefore, participants of the study were clustered in to four main groups according to their area of specialization. These are science and technology teachers, physics-chemistry-biology teachers, classroom teachers and teachers of other areas.

### 4.6.1. Means and Levels of Teachers' INSET Needs Depending on Area of Specialization for Each Dimension

Means and levels of four different groups' INSET need for each dimension are demonstrated in Table 34.

*Table 34: Means and Levels of Teachers' INSET Needs Depending on Area of Specialization for Each Dimension*

| Dimensions | Area of Specialization | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Science and Technology | | Physics-Chemistry-Biology | | Classroom teacher | | Other | |
| | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need |
| LTL | 1.876 | Not needed | 1.815 | Not needed | 2.583 | Not needed | 2.737 | Not sure |
| MC | 1.881 | Not needed | 1.589 | Strongly not needed | 2.875 | Not sure | 2.803 | Not sure |
| PE | 2.044 | Not needed | 1.879 | Not needed | 2.815 | Not sure | 2.711 | Not sure |
| EU | 2.252 | Not needed | 2.226 | Not needed | 2.500 | Not needed | 2.482 | Not needed |
| STSE | 2.239 | Not needed | 2.043 | Not needed | 2.702 | Not sure | 2.520 | Not needed |
| SPS | 2.240 | Not needed | 2.146 | Not needed | 2.553 | Not needed | 2.826 | Not sure |
| AV | 2.214 | Not needed | 2.028 | Not needed | 2.485 | Not needed | 2.624 | Not sure |
| GASTC | 2.361 | Not needed | 2.169 | Not needed | 2.695 | Not sure | 2.669 | Not sure |
| STL | 2.263 | Not needed | 2.137 | Not needed | 2.539 | Not needed | 2.684 | Not sure |
| MATM | 2.290 | Not needed | 2.242 | Not needed | 2.575 | Not needed | 2.744 | Not sure |
| TOTAL MEAN | 2.17 | Not needed | 2.03 | Not needed | 2.63 | Not sure | 2.68 | Not sure |

According to Table 34, science and technology teachers and physics-chemistry-biology teachers don't need INSET about 2004 Science and Technology Curriculum. However, classroom teachers and teachers of other areas applying science and technology curriculum are not sure whether they need training related to the curriculum.

In addition, Table 34 also shows means and levels of INSET need in each group according to dimensions of this study. Participants of this study who are science and technology teachers don't need INSET for all dimensions. Similarly, physics-chemistry-biology teachers also don't need training for all dimensions except MC dimension which they don't strongly need INSET. However, classroom teachers participated in this research study are not sure that they need in-service training about dimensions of MC, PE, STSE and GASTC. Furthermore, teachers of other areas are not sure whether they need training about dimensions except EU and STSE dimensions. Therefore, INSET needs of classroom teachers and teachers out of science area are higher than those of science and technology and physics-chemistry-biology teachers for all dimensions (Table 34).

### 4.6.2. Significance Level of Difference between Teachers' Area of Specialization and Their INSET Needs

This study aimed to determine significance level of differences between teachers' area of specialization and their INSET needs related to 2004 Science and Technology Curriculum. In order to approach this aim, analysis of variance F-test was used. The F-values and significance levels of differences for each dimension are shown in Table 35 ($p < 0.05$).

*Table 35: Significance Level of Differences between Teachers' Area of Specialization and Their INSET Needs Related to Each Dimension*

| Dimensions | F-values | p |
|---|---|---|
| LTL | 19.964 | .000* |
| MC | 45.096 | .000* |
| PE | 22.119 | .000* |
| EU | 1.796 | .148 |
| STSE | 7.660 | .000* |
| SPS | 3.897 | .009* |
| AV | 3.746 | .011* |
| GASTC | 5.524 | .001* |
| STL | 2.959 | .033* |
| MATM | 3.318 | .020* |
| Total Mean | 13.333 | .000* |

*significant at p<0.05

According to Table 35, there is a significant difference between INSET needs of teachers and their area of specialization in total mean with 13.33 F-value (p=0.00). In addition, there is also significant difference between these variables with reference to all dimensions out of EU dimension. Table 35 shows that LTL, MC, PE and STSE dimensions have the highest significance level of difference between teachers' INSET need and their areas of specialization (p=0.00). F-values of these dimensions are respectively 19.96, 45.10, 22.12 and 7.66 (p<0.05). Secondly, with reference to GASTC dimension there is a significant difference between training needs of science teachers and their area of specialization with p=0.001 and F=5.52. Thirdly, there is also a significant difference between the same variables in SPS dimension with p=0.009 and F=3.90. As a result, this implied that teachers applying Science and Technology Curriculum from different area of specialization have different INSET needs related to the curriculum.

Analysis of variance F-test shows that there are significant differences between science teachers' INSET need related to the curriculum and their area of specialization. However, F-test does not show which area of specialization is significantly different from one another. For this reason, Scheffe post hoc multiple comparisons were used between groups. The results of the test are shown in Table 36.

*Table 36: Significance Level of Differences between Areas of Specialization Groups for INSET Needs of Teachers According to Post Hoc Test Results*

| Dimensions | Area of Specialization | Classroom teacher | Other |
|---|---|---|---|
| LTL | Science and Technology | 0.000** | 0.001** |
| | Physics-Chemistry-Biology | 0.000** | 0.000** |
| MC | Science and Technology | 0.000** | 0.000** |
| | Physics-Chemistry-Biology | 0.000** | 0.000** |
| PE | Science and Technology | 0.000** | 0.034** |
| | Physics-Chemistry-Biology | 0.000** | 0.004** |
| EU | Science and Technology | 0.434 | 0.822 |
| | Physics-Chemistry-Biology | 0.331 | 0.766 |
| STSE | Science and Technology | 0.036** | 0.746 |
| | Physics-Chemistry-Biology | 0.001** | 0.315 |
| SPS | Science and Technology | 0.292 | 0.170 |
| | Physics-Chemistry-Biology | 0.094 | 0.079 |
| AV | Science and Technology | 0.409 | 0.464 |
| | Physics-Chemistry-Biology | 0.039** | 0.142 |
| GASTC | Science and Technology | 0.154 | 0.630 |
| | Physics-Chemistry-Biology | 0.004** | 0.206 |
| STL | Science and Technology | 0.423 | 0.471 |
| | Physics-Chemistry-Biology | 0.111 | 0.234 |
| MATM | Science and Technology | 0.264 | 0.274 |
| | Physics-Chemistry-Biology | 0.137 | 0.189 |

** significant at 0.05

Scheffe test implies that means of classroom teachers' INSET needs are significantly different from area of science and technology teachers and physics-chemistry-biology teachers in LTL, MC, PE and STSE ($p<0.05$). They are also different from physics, chemistry, biology teachers with reference to AV and GASTC ($p<0.05$). Moreover, LTL, MC, and PE dimensions reveal a significant difference between INSET needs of teachers who are out of science area and those of science and technology teachers and physics-chemistry-biology teachers ($p<0.05$).

## 4.7. INSET Needs of Science Teachers According to Their Gender and Marital Status

This survey study aimed to determine whether there is a significant difference between level of in-service training needs of science teachers and their gender or marital status.

### 4.7.1. Means and Levels of INSET Needs According to Gender and Marital Status of Teachers for Each Dimension

Means and levels of teachers' INSET need depending on their gender or marital status for each dimension are demonstrated in Table 37.

*Table 37: Means and Levels of INSET Needs According to Gender and Marital Status of Teachers for Each Dimension*

| Dimensions | Gender | | | | Marital Status | | | |
|---|---|---|---|---|---|---|---|---|
| | Female | | Male | | Married | | Single | |
| | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need | Mean of INSET Need | Level of INSET Need |
| LTL | 2.318 | Not needed | 2.538 | Not needed | 2.424 | Not needed | 2.288 | Not needed |
| MC | 2.515 | Not needed | 2.660 | Not sure | 2.602 | Not sure | 2.426 | Not needed |
| PE | 2.579 | Not needed | 2.584 | Not needed | 2.616 | Not sure | 2.444 | Not needed |
| EU | 2.416 | Not needed | 2.454 | Not needed | 2.476 | Not needed | 2.249 | Not needed |
| STSE | 2.524 | Not needed | 2.570 | Not needed | 2.600 | Not sure | 2.324 | Not needed |
| SPS | 2.459 | Not needed | 2.502 | Not needed | 2.529 | Not needed | 2.261 | Not needed |
| AV | 2.371 | Not needed | 2.442 | Not needed | 2.445 | Not needed | 2.205 | Not needed |
| GASTC | 2.537 | Not needed | 2.654 | Not sure | 2.632 | Not sure | 2.371 | Not needed |
| STL | 2.418 | Not needed | 2.529 | Not needed | 2.504 | Not needed | 2.274 | Not needed |
| MATM | 2.450 | Not needed | 2.600 | Not sure | 2.554 | Not needed | 2.303 | Not needed |
| TOTAL MEAN | 2.459 | Not needed | 2.553 | Not needed | 2.538 | Not needed | 2.315 | Not needed |

According to Table 37, INSET needs of male teachers are slightly higher than those of female teachers although both male and female science teachers don' need INSET about 2004 Science and Technology Curriculum are in the level of "not needed=2". Similarly, INSET needs of married science teachers are higher than those of single teachers even though participants of both groups don't need INSET about the curriculum.

When INSET needs of female and/or single are examined with reference to dimensions of the study, they don't need INSET about all dimensions. However, male teachers, differently from female teachers, are not sure that they need in-service training related to dimensions of MC, GASTC and MATM. Moreover, married teachers are not sure whether they need INSET about MC, PE, STSE and GASTC dimensions (Table 37). In addition, the highest INSET needs of both male teachers and married teachers are about dimension of GASTC with respectively 2.65 and 2.63 mean values while those of both female teachers and single teachers are related to dimension of PE with respectively 2.58 and 2.44 mean values.

### 4.7.2. Significance Level of Difference between Gender of Teachers and Their INSET Needs

In this research study, significance level of differences between gender of teachers and their INSET needs related to 2004 Science and Technology Curriculum was determined by using independent samples t-test. The t-values and significance levels of differences for each dimension are shown in Table 38 ($p < 0.05$).

*Table 38: Significance Level of Differences between Gender of Teachers and Their INSET Needs Related to Each Dimension*

| Dimensions | t-values | p |
|---|---|---|
| LTL | -2.26 | 0.02* |
| MC | -1.33 | 0.19 |
| PE | -0.05 | 0.96 |
| EU | -0.36 | 0.72 |
| STSE | -0.40 | 0.69 |
| SPS | -0.38 | 0.70 |
| AV | -0.63 | 0.53 |
| GASTC | -1.14 | 0.26 |
| STL | -0.97 | 0.34 |
| MATM | -1.51 | 0.13 |
| Total Mean | -1.09 | 0.28 |

* significant at 0.05

As Table 38 displayed that there is no significant difference between INSET needs of teachers and their gender in total mean since p value is greater than 0.05. However, with reference to LTL dimension there is a significant difference between in-service training needs of teachers and gender ($t=-2.26$; $p=0.02$). This is evidenced that perceived needs of female teachers are different from perceived needs of male teachers.

### 4.7.3. Significance Level of Difference between Marital Status of Teachers and Their INSET Needs

In this study, significance level of differences between marital status of teachers and their INSET needs related to the curriculum was determined by using independent samples t-test. The t-values and significance levels of differences for each dimension are shown in Table 39 ($p< 0.05$).

*Table 39: Significance Level of Differences between Marital Status of Teachers and Their INSET Needs Related to Each Dimension*

| Dimensions | t-values | p |
|---|---|---|
| LTL | 1.16 | 0.25 |
| MC | 1.36 | 0.18 |
| PE | 1.37 | 0.17 |
| EU | 1.84 | 0.07 |
| STSE | 2.04 | 0.04* |
| SPS | 1.99 | 0.05 |
| AV | 1.82 | 0.07 |
| GASTC | 2.15 | 0.03* |
| STL | 1.69 | 0.09 |
| MATM | 2.13 | 0.03* |
| Total Mean | 1.97 | 0.05 |

* significant at 0.05

According to Table 39, there is no significant difference between INSET needs of teachers and their marital status in total mean since p value is not less than 0.05. On the other hand, in STSE, GASTC and MATM dimensions, a significant difference exists between marital status of teacher and their INSET needs with respectively t=2.04, t=2.15 and t=2.13 ($p<0.05$). It means that perceived needs of married teachers are different from perceived needs of their single counterparts.

## 4.8. Correlations between INSET Needs of Science Teachers Related to Different Dimensions of Science and Technology Curriculum

This survey study proposed to find out INSET needs of teachers related to 2004 Science and Technology Curriculum in terms of field and methodology knowledge. It shows that INSET needs of teachers applying the curriculum are significantly different with respect to their area of specialization, their occupational experience, their gender and their marital status even though there is no significant difference between their INSET needs and their educational background, faculty of education and number of attention to INSETs planned by Ministry of National Education about 2004 Science and Technology Curriculum.

In addition to these findings, this study also indicates another result about INSET needs of science teachers related to dimensions of the study. According to that result, there are correlations between INSET needs of teachers related to ten different dimensions of the curriculum. Table 40 shows Pearson correlations which are significant at 0.01 levels between means of teachers' INSET needs for one dimension and those for another dimension.

*Table 40: Pearson Correlations between INSET Needs of Science Teachers related to Different Dimensions of Science and Technology Curriculum*

| Dimensions | LTL | MC | PE | EU | STSE | SPS | AV | GASTC | STL | MATM |
|---|---|---|---|---|---|---|---|---|---|---|
| LTL | | | | | | | | | | |
| MC | 0.827 | | | | | | | | | |
| PE | 0.797 | 0.887 | | | | | | | | |
| EU | 0.695 | 0.591 | 0.690 | | | | | | | |
| STSE | 0.711 | 0.670 | 0.760 | 0.763 | | | | | | |
| SPS | 0.662 | 0.622 | 0.715 | 0.676 | 0.772 | | | | | |
| AV | 0.640 | 0.577 | 0.670 | 0.652 | 0.733 | 0.874 | | | | |
| GASTC | 0.688 | 0.651 | 0.726 | 0.684 | 0.770 | 0.846 | 0.833 | | | |
| STL | 0.608 | 0.543 | 0.601 | 0.628 | 0.670 | 0.832 | 0.850 | 0.824 | | |
| MATM | 0.615 | 0.549 | 0.625 | 0.662 | 0.703 | 0.762 | 0.768 | 0.813 | 0.817 | |

Correlations are significant at 0.01 levels (2-tailed).

As shown in Table 40, the highest correlation is between INSET needs of teachers for PE and MC dimensions at 0.887. Moreover, INSET needs of teachers for SPS and AV dimensions are highly correlated at 0.874. The third highest correlation is between INSET needs of teachers for AV and STL dimensions at 0.850. Although correlation between INSET needs of teachers for MC and STL is the lowest one at 0.543, it is significant at 0.01 levels. These results can be inferred that INSET needs of teachers for one dimension increase while those of teachers for another dimension are increasing.

# CHAPTER V

# CONCLUSIONS

This chapter summarizes the results of the study which was aimed to assess in-service training needs of science teachers related to 2004 Science and Technology Curriculum in terms of field and methodology knowledge from $4^{th}$ to $8^{th}$ grades. In addition, the chapter makes recommendations for further studies.

## 5.1. Summary of the Results

This study has valuable implications for Ministry of National Education, Head of In-Service Training Department, faculties of education, and any organizations planned INSET for science teachers.

There are seven learning areas in 2004 Science and Technology Curriculum which were the dimensions of field knowledge in this research study. According to results of the study, teachers applying the curriculum don't need INSET for all dimensions. However, INSET need of these teachers related to Physical Events dimension had the highest mean value. Moreover, participants of the study are not sure whether they need INSET about applying experiments in physics subjects included in Physical Events dimension of the curriculum.

Similarly, science teachers have not exactly decided that they need INSET about subjects including inside of matter in chemistry although they implied that they don't need training about Matter and Change dimension of the curriculum.

Furthermore, the highest mean of INSET need in the survey was for an item assessed INSET needs of teachers for subjects of heredity, DNA and genetic diversity and related to Living Things and Life dimension of the curriculum, although this dimension had the lowest mean of INSET need among other dimensions. There were items in the "not sure" level of INSET need. Science teachers participated in the study implied that they were not sure whether they need INSET about subjects of these items related to *cellular biology and the ecology*.

Moreover, there is a similar finding for INSET needs of teachers about Earth and Universe dimension. Participants of the study were not sure that they needed INSET about celestial bodies in the space, research studies about space and plate tectonics of Earth crust.

Finally, with reference to relations of Science-Technology-Society-Environment and Scientific Process Skills dimensions, teachers participated in the study may need INSET to support students for hypothesizing with determined variables, to make inquiry in science, to be aware of different points of views about problems in science. However, science teachers don't need training to improve their skills about Attitudes and Values dimension of the curriculum.

There are three dimensions of methodology knowledge related to 2004 Science and Technology Curriculum in this research study. According to results of the study, teachers don't need INSET for the dimensions of methodology knowledge. On the other hand, in terms of General Approaches of Science and Technology Curriculum dimension, participants of the study may need INSET about using lab equipments, revealing higher thinking skills of students, using technological equipments, applying spiral principle of the curriculum, which are *important points in the general approach of the curriculum*. Similarly, with reference to Measurement-Assessment Techniques and Methods dimension, teachers may need

INSET about *alternative assessment tools* such as rubric, V-diagram, structured grid, diagnosis branches tests. These types of assessment tools are difficult to understand, to prepare and to apply. These results imply that participants of the study were not sure whether they need INSET about general approaches of the curriculum and assessment techniques.

Findings of the study related to INSET needs of teachers about making observation, using science equipments and applying experiments concur with the findings of the studies conducted by Ogan-Bekiroglu (2007), Osman, Halim, & Meerah (2006), Noh, Cha, Kang, & Scharmann (2004) and which indicated that strongest INSET needs of teachers are about conducting lab sessions, using science equipments, and integration of multimedia technology.

Most of the items in "not sure" level of INSET needs were related to $7^{th}$ and $8^{th}$ grade of the curriculum. This can be reason of that the subjects of science in $7^{th}$ and $8^{th}$ grade are more complex and include high level of Physical Events and Matter and Change dimensions.

Science and technology teachers and physics-chemistry-biology teachers don't need INSET about the curriculum for all dimensions. On the other hand, classroom teachers and teachers from other branches may need INSET for many dimensions. So, there is a significant difference between INSET need of teachers and their area of specialization at 0.05. Its reason may be that classroom teachers apply science and technology curriculum until $6^{th}$ grade. However, they have to know the subjects of science between $6^{th}$ and $8^{th}$ grades since science and technology curriculum has a spiral principle. Moreover, teachers from out of science area may need INSET for most of the dimensions since they may not have enough field and methodology knowledge about science and technology curriculum. This finding is incompatible with the findings of the study completed by Osman, Halim, & Meerah (2006), which is explained that needs of science teachers in the *knowledge and skills in science subjects* and *integration of multimedia technology in science teaching* dimensions are not significantly related to area of specialization.

According to study of Ogan-Bekiroglu (2007), INSET needs of female teachers are higher than those of their male counterparts. On the other hand, this survey study showed that male and/or married teachers' INSET needs are higher than those of female and/or single teachers for all dimensions. Gender differences are significant at 0.05 for Living Things and Life. Marital status differences are significant at 0.05 for relations of Science-Technology-Society-Environment, General Approaches of Science and Technology Curriculum and Measurement-Assessment Techniques and Methods.

There are high correlations for INSET need related to dimensions of the curriculum. INSET needs of teachers for one dimension increase while those for another dimension are increasing. These correlations are very high among first four learning areas of the curriculum which are Living Things and Life, Matter and Change, Physical Events, and Earth and Universe or among dimensions of methodology knowledge.

In conclusion, the findings of the present study which has suggestions for organizations planned INSET shows that teachers applying 2004 Science and Technology Curriculum may need INSET for field knowledge such as *applying experiments in physics subjects, inside of matter which is not easy to observe*, *cellular biology and ecology, research studies and subjects about universe which are* *difficult to make observations*. Moreover, they may also need INSET for methodology knowledge, especially *important points in the general approach of the curriculum* and *alternative assessment tools*. In addition to that, INSET needs about subjects of 7$^{th}$ and 8$^{th}$ grades are higher than those of other grades in Physical Events, and Earth and Universe dimensions. Furthermore, INSET needs of classroom teachers and teachers out of science area are different from those of teachers from science area. Similarly, INSET needs of male and/or married teachers are different from those of their female and/or single counterparts. Finally, there are high positive correlations between INSET needs related to each dimensions of the study which means that INSET need for a dimension increases while INSET need for another dimension is increasing.

## 5.2. Recommendations for Further Studies

This study has several recommendations for further studies. Firstly, this research study is an Istanbul sample to find out INSET needs of science teachers related to the curriculum in terms of field and methodology knowledge. Since “2004 Science and Technology Curriculum” is applied in all schools of Turkey, it is recommended to repeat this study with a new sample group from different parts of Turkey whether there is a difference between INSET needs of teachers related to the science and technology curriculum in Istanbul and in other parts of Turkey.

Moreover, it is suggested that INSET needs of science teachers and their views about applied INSET programs would be asked with teacher group interviews and the same variables of the study so that more detailed data may be collected.

Finally, it would be interesting to plan and prepare an INSET program for teachers applying the science and technology curriculum according to the results of this research study. After the application of INSET program, its effectiveness on science teachers might be assessed.

APPENDECIES

APPENDIX A

Assessment Scale of Science Teachers' INSET Needs Related to 2004 Science and Technology Curriculum in Terms of Field and Methodology Knowledge

ASSESSMENT SCALE OF SCIENCE TEACHERS' INSET NEEDS RELATED TO 2004 SCIENCE AND TECHNOLOGY CURRICULUM IN TERMS OF FIELD AND METHODOLOGY KNOWLEDGE

This survey was prepared to assess in-service training needs of science teachers related to 2004 Science and Technology Curriculum in terms of field and methodology knowledge. Data collected from results of survey will be utilized in my MA thesis for Education Planning and Leadership in Institute of Educational Sciences in Yeditepe University.

Survey includes two parts. There is Form A in which your personal information is asked in the first part. You can use "**X**" sign for questions with alternatives while you can write a proper explanation for your situation in other questions in Form A. The personal information will be kept private since the research study has scientific attribute.

There is Form B in which you will specify your in-service training need related to 2004 Science and Technology Curriculum in terms of field and methodology knowledge in the second part.

Thanks already for your contribution by believing that you will answer the questions honestly and closely.

**Sema Küçükmert Ertekin**
Yeditepe University
Institute of Educational Sciences
Education Planning and Leadership
MA Student

FORM A
Personal Information

1. Gender? Female ☐ Male ☐
2. Marital Status? Married ☐ Single ☐
3. City in which you work ☐
4. Borough in which you work ☐
5. Your educational background?
   - Educational Institute ☐
   - Training College ☐
   - Undergraduate ☐
   - Graduate ☐
   - Doctorate ☐
   - Others ☐
6. University of graduation? ☐

   Faculty of graduation? ☐

   Graduation year? ☐
7. Your area of specialization
   - Science and Technology ☐
   - Biology ☐
   - Physics ☐
   - Classroom teacher ☐
   - Chemistry ☐
   - Others ☐
8. Your occupational experience?
   - 0–5 years ☐
   - 6–10 years ☐
   - 11–15 years ☐
   - 16–20 years ☐
   - 21–25 years ☐
   - 26 years and over ☐
9. Have you ever attended to in-service education and training programs related to 2004 Science and Technology Curriculum and planned by Ministry of National Education? If yes, how many times you have attended?

   Yes, I have attended ☐ I have attended ……… time(s)

   No, I have not attended ☐

FORM B

Assessment Scale of Science Teachers' INSET Needs Related to 2004 Science and Technology Curriculum in Terms of Field And Methodology Knowledge

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 1 | Reproduction and growing in cells, human, animals and plants | | | | | |
| 2 | Classification of living things | | | | | |
| 3 | Examining different kinds of cells in microscope | | | | | |
| 4 | Balanced and healthy nutrition | | | | | |
| 5 | Food chain | | | | | |
| 6 | Carbon, nitrogen and water cycles | | | | | |
| 7 | Skeleton and muscular system | | | | | |
| 8 | Blood circulation system | | | | | |
| 9 | Respiratory system | | | | | |
| 10 | Excretory system | | | | | |
| 11 | Digestion system | | | | | |
| 12 | Nervous and endocrine system | | | | | |
| 13 | Mitosis and meiosis | | | | | |
| 14 | Importance of reproduction with sygamia and agamogony for organisms | | | | | |
| 15 | Heredity, DNA and genetic diversity | | | | | |
| 16 | Biological diversity and ecology | | | | | |
| 17 | Sensorial organs | | | | | |
| 18 | Recycling and renewable energy sources | | | | | |

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 19 | Importance and properties of fungus and microscopic organisms | | | | | |
| 20 | Effects of cigarette and alcohol on human body and society | | | | | |
| 21 | Structure of atom and distribution of electrons | | | | | |
| 22 | Relations of atom-molecule-element-compound concepts | | | | | |
| 23 | Explaining differences among physical change, chemical change and change in physical conditions with experiments | | | | | |
| 24 | Classification of matters (like natural, artificial, maufactured, pure, mixture) | | | | | |
| 25 | Explaining basic properties of solids, liquids and gases with experiments | | | | | |
| 26 | Explaining methods of separating mixtures with experiments | | | | | |
| 27 | Energy sources which depends on Sun | | | | | |
| 28 | Calculations, experiments and drawing graphs about heat and temperature | | | | | |
| 29 | Explaining ways of heat dispersion | | | | | |
| 30 | Explaining relations between chemical bounds and chemical reactions | | | | | |
| 31 | Elements in periodic systems | | | | | |
| 32 | Applying acids and bases experiments | | | | | |
| 33 | Applying experiments of mass and volume measurement | | | | | |
| 34 | Determining distinguishing properties of matters with experiments | | | | | |
| 35 | Calculating velocity of a mass by measuring distance depending on time | | | | | |
| 36 | Interpreting graphs of time and distance of mass | | | | | |
| 37 | Measuring force by using dynamometer | | | | | |
| 38 | Applying spiral spring experiments | | | | | |

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 39 | Applying buoyant force of liquids and gases experiments | | | | | |
| 40 | Calculating pressure of solid-liquid-gases | | | | | |
| 41 | Explaining simple machine by modeling | | | | | |
| 42 | Transformation of energy from one kind to another | | | | | |
| 43 | Basics of static electricity | | | | | |
| 44 | Dependent variables of resistance for a conductor | | | | | |
| 45 | Parallel and serial electric circuits | | | | | |
| 46 | Measurement of current and voltage of conductors in an electrical circuit | | | | | |
| 47 | Applying optic experiments | | | | | |
| 48 | Applying sound experiments | | | | | |
| 49 | Explaining basic properties of mirror and lenses with experiments | | | | | |
| 50 | Modeling and using a sundial | | | | | |
| 51 | Solar eclipse and lunar eclipse | | | | | |
| 52 | Calculating electrical power | | | | | |
| 53 | Magnets and magnetic field strength of electric current | | | | | |
| 54 | Dependent variables of lamp brightness in an electrical circuit | | | | | |
| 55 | Classifying rocks in the crust of Earth | | | | | |
| 56 | Erosion and different kinds of soil | | | | | |
| 57 | Formation of earth | | | | | |
| 58 | Solar system and its planets | | | | | |

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 59 | Motion and phases of moon | | | | | |
| 60 | Natural monument of Earth | | | | | |
| 61 | Ground water sources, water of oceans, seas, lakes and rivers | | | | | |
| 62 | Celestial bodies in the space | | | | | |
| 63 | Research studies about space | | | | | |
| 64 | Heaves of earth crust | | | | | |
| 65 | About meteorological events | | | | | |
| 66 | Classifying layers of earth | | | | | |
| 67 | Understanding nature of science | | | | | |
| 68 | Understanding relation between science and technology | | | | | |
| 69 | Understanding interaction of science and technology with society and environment | | | | | |
| 70 | Strategies applied in solving problems in science and technology | | | | | |
| 71 | Improving critical and responsible attitude towards innovations in science and technology | | | | | |
| 72 | Effects of nature of science and history of science on society | | | | | |
| 73 | Inquiry in scientific processes and technological solutions | | | | | |
| 74 | Improving creative solutions by using science and technology | | | | | |
| 75 | Being aware of different points of views about problems in science and technology | | | | | |
| 76 | Supporting student for observation | | | | | |
| 77 | Supporting students for making comparison and implication after observation | | | | | |

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 78 | Supporting students for predicting depended on observation and implication | | | | | |
| 79 | Supporting students for determining variables of an experiment | | | | | |
| 80 | Supporting students for hypothesizing with determined variables | | | | | |
| 81 | Supporting students for making experiments | | | | | |
| 82 | Supporting students for collecting and recording data | | | | | |
| 83 | Supporting students for making graphs depended on data | | | | | |
| 84 | Supporting students for interpreting and inferring data | | | | | |
| 85 | Supporting students for presentation of findings | | | | | |
| 86 | Measuring attitudes of students related to science and technology | | | | | |
| 87 | Improving attitudes and values related to benefits of scientific and technological knowledge for individual, society and environment | | | | | |
| 88 | Supplying students to perceive what is happening in their environment | | | | | |
| 89 | Supplying students to react in a proper and positive way for a situation | | | | | |
| 90 | Supplying students to improve positive values about objects and events | | | | | |
| 91 | Supplying students to organize values developed by themselves in their self-esteem | | | | | |
| 92 | Supplying students to improve a life style including positive attitudes and values | | | | | |
| 93 | Fundamental philosophy of 2004 Science and Technology Curriculum | | | | | |
| 94 | Vision, purposes and targets of 2004 Science and Technology Curriculum | | | | | |
| 95 | Differences between 2002 Science Curriculum and 2004 Science and Technology Curriculum | | | | | |
| 96 | Applying spiral principle of 2004 Science and Technology Curriculum | | | | | |
| 97 | Making relation of science and technology course with other disciplinary and courses | | | | | |

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 98 | Planning instruction according to individual differences of students | | | | | |
| 99 | Organizing proper instructional medium for students needed special education | | | | | |
| 100 | Teaching science and technology with constructivism | | | | | |
| 101 | Teaching strategies which reveal higher thinking skills of students | | | | | |
| 102 | Qualities of homework given to students | | | | | |
| 103 | Supplying students to gain knowledge and skills which are necessary for security in science laboratory | | | | | |
| 104 | Knowing and using science laboratory equipments | | | | | |
| 105 | Using different materials, audio-visual resources, computer, and other technological equipments during science and technology instruction | | | | | |
| 106 | Making relation of science subjects with daily life during instruction | | | | | |
| 107 | Directing students to scientific research | | | | | |
| 108 | Directing students to inquiry | | | | | |
| 109 | Directing students to critical thinking | | | | | |
| 110 | Directing students to solve problem | | | | | |
| 111 | Directing students to make decisions | | | | | |
| 112 | Directing students to lifelong learning | | | | | |
| 113 | Developing activities about increasing self-confidence of students related to science | | | | | |
| 114 | Developing activities about increasing motivations of students related to science | | | | | |
| 115 | Differences about alternative and traditional measurement and assessment techniques | | | | | |
| 116 | Using rubrics in assessment and measurement of students | | | | | |
| 117 | Assessing students’ behavior by observation | | | | | |

| By using the scale 1-Strongly not needed, 2-Not needed, 3-Not sure, 4-Needed, 5-Strongly needed specify your in-service training need about the subjects determined as followed | | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| 118 | Assessing students with their oral presentations | | | | | |
| 119 | Assessing students' project depended on scientific research | | | | | |
| 120 | Giving directions to students in peer assessment | | | | | |
| 121 | Assessing students by using portfolios | | | | | |
| 122 | Improving activities in the process of performance assessment of students | | | | | |
| 123 | Assessing students by using concept maps | | | | | |
| 124 | Using V-diagram in assessing students | | | | | |
| 125 | Using structured grid in assessing students | | | | | |
| 126 | Using diagnosis branches tests in assessing students | | | | | |
| 127 | Writing proper questions for acquisitions of curriculum | | | | | |
| 128 | Preparing proper answer key for assessment and measurement tools | | | | | |
| 129 | Evaluating data obtained from measurement tools | | | | | |

# APPENDIX B

Official Letters

T.C.
İSTANBUL VALİLİĞİ
İl Milli Eğitim Müdürlüğü

Sayı : B.08.4.MEM.4.34.00.18.580/ 20238 — 22 Şubat 2010
Konu: **Anket.**
**(Sema KÜÇÜKMERT)**

VALİLİK MAKAMINA

İlgi : a-)Yeditepe Üniversitesi Rektörlüğü'nün 29/01/2010 tarih ve 675 sayılı yazısı.
b-)Milli Eğitim Bakanlığına Bağlı Okul ve Kurumlarda Yapılacak Araştırma ve Araştırma Desteğine Yönelik İzin ve Uygulama Yönergesi.
c-)Milli Eğitim Bakanlığı Eğitim Araştırma Geliştirme Dairesi Başkanlığı'nın 11/04/2007 tarih ve 1950 sayılı emri.
d-)Milli Eğitim Müdürlüğü Anket Komisyonu'nun 18/02/2010 tarihli tutanağı.

Yeditepe Üniversitesi Eğitim Bilimleri Enstitüsü Eğitim Planlaması ve Liderlik Yüksek Lisans öğrencisi **Sema KÜÇÜKMERT'in**, İlimizde ekte isimleri belirtilen okullarda uygulanmak üzere **"2004 Fen ve Teknoloji Dersi Programı Doğrultusunda Yöntem ve Alan Bilgisi Açısından Fen ve Teknoloji Öğretmenlerinin Hizmet İçi Eğitim İhtiyaçlarının Değerlendirilmesi"** konulu anket çalışmalarını yapma istekleri hakkındaki İlgi (a) yazı ve ekleri Müdürlüğümüzce incelenmiştir.

Yeditepe Üniversitesi Eğitim Bilimleri Enstitüsü Eğitim Planlaması ve Liderlik Yüksek Lisans öğrencisi **Sema KÜÇÜKMERT'in**, İlimizde ekte isimleri belirtilen okullarda uygulanmak üzere **"2004 Fen ve Teknoloji Dersi Programı Doğrultusunda Yöntem ve Alan Bilgisi Açısından Fen ve Teknoloji Öğretmenlerinin Hizmet İçi Eğitim İhtiyaçlarının Değerlendirilmesi"** konulu anket çalışmalarını yapması, bilimsel amaç dışında kullanılmaması koşuluyla, okul idarelerinin denetim, gözetim ve sorumluluğunda, İlgi (c) Bakanlık Emri esasları dahilinde uygulanması, sonuçtan Müdürlüğümüze rapor halinde (CD formatında)bilgi verilmesi kaydıyla Müdürlüğümüzce uygun görülmektedir.

Makamınızca da uygun görüldüğü takdirde Olurlarınıza arz ederim.

Dr. Muammer YILDIZ
Milli Eğitim Müdürü

EKLER :
Ek-1. İLGİ (a)yazı ve ekleri

OLUR
19/02/2010
[illegible] KAYA
Vali a.
Vali Yardımcısı

**NOT** :Verilecek cevapta tarih, kayıt numarası, dosya numarası yazılması rica olunur.
Adres :İstanbul Milli Eğitim Müdürlüğü A.Blok Ankara cad. No:2 Cağaloğlu 526 13 82

T.C.
YEDİTEPE ÜNİVERSİTESİ
REKTÖRLÜĞÜ

SAYI : B.30.2.YTÜ.0.70.00.00-6300/ 675
KONU : Anket (Sema KÜÇÜKMERT)

29 Ocak 2010

İSTANBUL İL MİLLİ EĞİTİM MÜDÜRLÜĞÜNE
CAĞALOĞLU

Üniversitemiz Eğitim Bilimleri Enstitüsü ''Eğitim Planlaması ve Liderlik'' Yüksek Lisans öğrencilerinden Sema KÜÇÜKMERT İstanbul İli genelindeki devlet okullarında 4, 5, 6, 7 ve 8. sınıf seviyelerinde Fen ve Teknoloji Dersine giren Öğretmenlere uygulanmak üzere "2004 Fen ve Teknoloji Dersi Programı Doğrultusunda Yöntem ve Alan Bilgisi Açısından Fen ve Teknoloji Öğretmenlerinin Hizmet İçi Eğitim İhtiyaçlarının Değerlendirilmesi" konulu anket çalışmasını Yüksek Lisans Tezi için yürütmek istemektedir.

Gerekli iznin verilmesini rica ederim.

Prof. Dr. Ahmet ŞERPİL
Rektör

26 Ağustos Yerleşimi Kayışdağı Caddesi 34755 Kayışdağı / Erenköy İSTANBUL
Tel: (0 216) 578 02 08- 578 02 09 Faks: (0 216) 578 02 99

T.C.
İSTANBUL VALİLİĞİ
İl Milli Eğitim Müdürlüğü

Sayı : B.08.4.MEM.4.34.00.18.580/ 20610 — 23.. Şubat 2010
Konu : **Anket.**
**(Sema KÜÇÜKMERT)**

**YEDİTEPE ÜNİVERSİTESİ REKTÖRLÜĞÜNE**

İlgi: a) 29/01/2010 tarih ve 675 sayılı yazınız.
b) Valilik Makamının 22/02/2010 tarih ve 20238 sayılı Oluru.
c) Milli Eğitim Bakanlığı Eğitim Araştırma ve Geliştirme Dairesi Başkanlığı'nın Okul ve Kurumlarda Yapılacak Araştırma ve Araştırma Desteğine Yönelik izin ve Uygulama Yönergesi.

Yeditepe Üniversitesi Eğitim Bilimleri Enstitüsü Eğitim Planlaması ve Liderlik Yüksek Lisans öğrencisi **Sema KÜÇÜKMERT'in**, İlimizde ekte isimleri belirtilen okullarda uygulanmak üzere **"2004 Fen ve Teknoloji Dersi Programı Doğrultusunda Yöntem ve Alan Bilgisi Açısından Fen ve Teknoloji Öğretmenlerinin Hizmet İçi Eğitim İhtiyaçlarının Değerlendirilmesi"** konulu anket çalışmasını yapma isteği ilgi (b) Valilik Oluru ile uygun görülmüştür.

Bilgilerinizi, gereğinin ilgi (b) Valilik Oluru doğrultusunda, gerekli duyurunun anketçi tarafından yapılmasını, işlem bittikten sonra 2(iki) hafta içinde sonuçtan Müdürlüğümüz Kültür Bölümüne rapor halinde bilgi verilmesini arz ederim.

Mustafa USLU
Müdür a.
Müdür Yardımcısı V.

EKLER :
Ek-1. İlgi (b) Valilik Oluru.
2. Anket soruları.

EĞİTİME %100 DESTEK 4440632

*NOT : Verilecek cevapta tarih, kayıt numarası, dosya numarası yazılması rica olunur.*
*Adres : İstanbul Milli Eğitim Müdürlüğü A.Blok Ankara cad. No:2 Cağaloğlu 2125261382*
*E-Mail : kultur34@meb.gov.tr Web : http://istanbul.meb.gov.tr/bolumler/kultur*

29.01.2010

İstanbul İl Milli Eğitim Müdürlüğü'ne,

Yeditepe Üniversitesi, Eğitim Bilimleri Enstitüsü, Eğitim Planlaması ve Liderliği bölümünde yüksek lisans öğrencisi olan Sema Küçükmert Ertekin "2004 Fen ve Teknoloji Dersi Programı Doğrultusunda Yöntem ve Alan Bilgisi Açısından Fen ve Teknoloji Öğretmenlerinin Hizmet İçi Eğitim İhtiyaçlarının Değerlendirilmesi" başlıklı tezi danışmanlığımda hazırlamaktadır.

Tez çalışması için, İstanbul genelindeki devlet okullarında, Şubat-Mart-Nisan 2010 aylarında, 4, 5, 6, 7 ve 8. sınıf seviyelerinde Fen ve Teknoloji dersine giren öğretmenlere hazırlamış olduğu anketi uygulaması gerekmektedir.

Anketin uygulanması için gerekli iznin verilmesi konusunda gereğini arz ederim.

Erdoğan

Prof. Dr. İrfan Erdoğan

Araştırma Danışmanı

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