TURKISH STUDENTS’ ATTITUDES TOWARDS SCIENCE IN EARLY CHILDHOOD EDUCATION

Thesis

Submitted to

The School of Education and Allied Professions of the UNIVERSITY OF DAYTON

In Partial Fulfillment of the Requirements for

The Degree

Master of Science in Early Childhood Education

By

Ahmet Simsar

Dayton, Ohio

May, 2013
TURKISH STUDENTS’ ATTITUDES TOWARDS SCIENCE IN EARLY CHILDHOOD EDUCATION

Name: Simsar, Ahmet

APPROVED BY:

__________________________________________
Shauna M. Adams, Ed.D.
Committee Chair

__________________________________________
Lesley A. McCue, Ph.D.
Committee Member

__________________________________________
Joy L. Comingore, M.A.
Committee Member
ABSTRACT

TURKISH STUDENTS’ ATTITUDES TOWARDS SCIENCE IN EARLY CHILDHOOD EDUCATION

Name: Simsar, Ahmet
University of Dayton
Advisor: Shauna M. Adams, Ed.D.

The purpose of the study was to identify Turkish students’ attitudes towards science and to ascertain the causes of them. A survey, which is a quantitative design, was used for this research. The data was collected with the Child’s Attitude Toward Science (CATS) survey which was developed by this researcher.
Dedicated to my family
ACKNOWLEDGEMENTS

To my father, mother, brothers and sisters, thank a lot for always supporting and encouraging me throughout my education. To my all friends, classmates, teachers and professors, thank you for supporting and encouraging me to learn more. I truly thank the Turkish Ministry of National Education for supporting me during my master’s degree.

I would like to express my deepest thanks to Dr. Shauna M. Adams, my advisor, for her encouragement, patience, understanding, and guidance throughout the study. I sincerely appreciate Dr. Lesley McCue for her help, encouragement and guidance during data analyzes and completing last chapters of the study.

I would also like to express my appreciation to early childhood teachers for their willing participation.
TABLE OF CONTENTS

ABSTRACT ........................................................................................................................................ iv

DEDICATION .................................................................................................................................... v

ACKNOWLEDGEMENTS .................................................................................................................. vi

TABLE OF CONTENTS ..................................................................................................................... vii

LIST OF FIGURES ........................................................................................................................... x

LIST OF TABLES .............................................................................................................................. xi

CHAPTER 1 INTRODUCTION ............................................................................................................ 1

1.1. Background of the Study ........................................................................................................... 1

1.2. Purpose of the Study .................................................................................................................. 5

1.3. Research Questions .................................................................................................................... 6

1.4. Significance of the Study .......................................................................................................... 7

CHAPTER 2 REVIEW OF THE LITERATURE .................................................................................... 10

2.1. Science in Early Childhood Education ..................................................................................... 11

2.2. The Basics of Science Process .................................................................................................. 13

2.2.1 Observing ............................................................................................................................... 14
2.2.2 Comparing ................................................................. 15
2.2.3 Classifying ............................................................... 15
2.2.4 Measuring ................................................................. 15
2.2.5 Communicating ......................................................... 15
2.3. Science Content Areas .................................................... 17
  2.3.1. Physical Science ..................................................... 17
  2.3.2. Earth and Space Science ......................................... 18
  2.3.3 Life Science ........................................................... 19
2.4. Importance of Science .................................................... 19
2.5. Goals of Science .......................................................... 21
2.6. Teachers’ Roles in Science Teaching ................................. 22
2.7. Multiculturalism in Science ............................................ 26
2.8. Attitudes toward Science and Science Education .................. 27

CHAPTER 3 RESEARCH METHODOLOGY ...........................................32
  3.1. Design of the Study ...................................................... 32
  3.2. Characteristics of Participants ....................................... 32
  3.3. Instrument ............................................................... 33
  3.4. Validity of the Scale ................................................... 34
  3.5. Reliability of the Scale ................................................ 34
  3.5. Data Analysis .......................................................... 35
  3.6. Hypothesis ............................................................... 35

CHAPTER 4 RESULTS OF THE STUDY ............................................37
4.1. Demographic Information of Participants and Characteristics of Their Turkish Students .......... 37
4.1.1. Demographic Information about Participants and Their Classrooms .................................. 37
4.1.2. Demographic Information of Students’ Characteristics .......................................................... 40
4.2. Analyzing of Research Hypothesis ............................................................................................... 42
4.3. Summary of Findings ..................................................................................................................... 53

CHAPTER 5 CONCLUSIONS, DISCUSSIONS, LIMITATIONS, AND RECOMMENDATIONS ......................... 59

5.1. Conclusions ...................................................................................................................................... 59
5.2. Discussions ...................................................................................................................................... 60
5.3. Limitations of the Study .................................................................................................................. 64
5.4. Recommendations .......................................................................................................................... 65

REFERENCES ........................................................................................................................................ 70

APPENDIX A: TEACHER’S PART OF SURVEY .................................................................................. 80

APPENDIX B: CHILDREN’S ATTITUDES TOWARD SCIENCE SURVEY .................................................. 81
LIST OF FIGURES

Figure 1.1 *Importance of STEM Education* .......................................................... 7
LIST OF TABLES

Table 4.1 Frequencies and Percents for Teacher’s Experience with Turkish Students 
(N=44) ..................................................................................................................38

Table 4.2 Frequencies and Percents for Frequencies of Using Science Activities in Classrooms (N=44) .............................................................................................................38

Table 4.3 Frequencies and Percents for Time of Using Science Activities in A Day (N = 44) ..................................................................................................................39

Table 4.4 Frequencies and Percents for Teaching Style (N = 44) .........................39

Table 4.5 Frequencies and Percents for Qualities of Science Corners/Areas (N = 44) ...40

Table 4.6 Frequencies and Percents for Students’ Ages (N = 44) .........................40

Table 4.7 Frequencies and Percents for Students’ Learning Style(s) (N = 44) ............41

Table 4.8 Frequencies and Percents for Students’ Success in Science Process (N = 44) 41

Table 4.9 Frequencies and Percents for Students’ Success in Other Activities (N = 44) .42

Table 4.10 Frequency and Percents for Children’s Attitudes Toward Science and Science Areas (N=44) ..................................................................................................................43

Table 4.11 Results of ANOVA Scores of Student’s Attitudes toward Science According to Their Ages (N= 44) .........................................................................................45

Table 4.12 Results of ANOVA Scores of Student’s Attitudes Toward Science According to Their Learning Styles (N = 44) .........................................................................................46
Table 4.13 Results of ANOVA Scores of Student’s Attitudes Toward Science According to Their Success in Science Process (N = 44) .................................................................47

Table 4.14 Results of ANOVA Scores of Student’s Attitudes Towards Science According to Their Success in Other Activities (N = 44) .................................................................48

Table 4.15 Results of ANOVA Scores of Student’s Attitudes toward Science According to Teachers’ Years of Teaching Experience with Turkish Students (N = 44) ..............49

Table 4.16 Results of ANOVA Scores of Student’s Attitudes toward Science According to Frequency of Using Science Activities in A Week (N = 44) ...........................................50

Table 4.17 Results of ANOVA Scores of Student’s Attitudes toward Science According to Time of Using Science Activities in A Day (N = 44) .....................................................51

Table 4.18 Results of ANOVA Scores of Student’s Attitudes toward Science According to Qualities of Science Corners/Areas (N = 44) .................................................................52

Table 4.19 Results of ANOVA Scores of Student’s Attitudes toward Science According to Teaching Style(s) (N = 44) ...............................................................................53
CHAPTER 1
INTRODUCTION

1.1. Background of the Study

Global Trends in Science Education

Quality education in the 21st century is dependent on a well-educated workforce. To that end, education has become globally focused with achievement test scores in literacy, math and science being compared across developing countries. The Program for International Students Assessment (PISA) showed that “In 2009, the percentage of high-performing 15-year-olds in the United States was higher in reading literacy, lower in mathematics literacy, and not measurably different in science literacy than the respective percentages in the OECD countries on average” (Aud, Hussar, Johnson, Kena, Roth, Manning, Wang & Zhang, 2012, p.68).

These same PISA results showed that Shanghai students were in first place with scores of 575 in science. Students in the United Stated were in 23rd place with science scores of 502. Poland, Ireland, Norway, France and several other countries had similar performances with the US (OECD, 2010).
Current Trends in US Early Childhood

In the US, early childhood education has emerged as an important factor in efforts to improve education. Researchers define early childhood as preprimary programs including, preschool, and nursery school. Aud, et al (2012) found that, “The percentage of 3- to 5-year-olds enrolled in full-day preprimary programs increased from 32 percent in 1980 to 58 percent in 2010” (p.18).

In the United States, the effort to close the achievement gap is great and early childhood is seen as an important tool for teachers who are concerned about children who come from disadvantaged life experiences. These life experiences include poverty, being English Language Learners and other factors that can impact their educational success. Another factor is having parents with low educational levels, which may impact their ability to support their children’s education. For example, students from low income families enter kindergarten with lower scores on tests of readiness (Copple & Bredekamp, 2009).

According to the Copple and Bredekamp, (2009) “Concerns over the persistence of achievement gaps between subgroups are part of a larger concern about lagging students’ achievement in the United States and its impact on American economic competitiveness in an increasingly global economy”(p. 2). In 2001, the No Child Left Behind Act (NCLB) dictated that all children have equal opportunities in their education. This law covered students who are Economically Disadvantaged (E.D.), Not Economically Disadvantaged (N.E.D.), racial and ethnic minorities (White, Black,
Hispanic, American-Indian, Asian, Pacific Islander, Two or More Races…etc.), special needs, English Language Learners (ELL), and Limited English Proficiency (L.E.P.).

**Defining Early Childhood Education**

Early childhood education supports children across developmental emotional, domains including social, emotional cognitive, language, motor and physical development, and also helps children acquire the skills that school readiness. According to Akkose (2008), children achieve 70% of their mental and personal development during the early childhood years. Akkose showed that children who participate in early childhood education have better development in their social and emotional skills are more successful in completing useful activities, demonstrating creativity, problem solving, and applying inquiry and observational skills than children who do not participate in early childhood education.

**English Language Learners**

According to the US Census Bureau statistics, in the US, immigrant populations are significantly increased. Immigrant populations live mostly in poverty and many lack health insurance. The Census also reported that immigrant 5 years of ages and older comprise 6.3% of the population of the States of Ohio and are 3.9% of the population in the city of Dayton, speak different languages at home (2010). According to the Aud et al (2012), the percentage of English Language Learners (ELL) who entered public schools was 8%, or an estimated 3.7 million in the United States. These statistics show that diversity in US schools is expanding.
According to the Aydingün, Harding, Hoover, Kuznetsov, & Swerdlow (2006), “Approximately 350,000 to 400,000 Meskhetian Turks live in nine different countries: Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, the Russian Federation, Turkey, Ukraine, Uzbekistan, and the United States” (p.1) In the United States, approximately 9,000 Meskhetian Turks (also known as Ahiska Turks) immigrated from the Krasnodar region which has been part of Russia until 2004. They live in 33 states and their largest communities are in Pennsylvania (785 residents) and Georgia (623 residents). However, the data from the Ahiska Turkish American Community Center (ATACC) (2012) state that the largest Meskhetian Turks populations are in Dayton, Ohio (where over 1300 have settled). Page (2011) stated that 240 Meskhetian families are currently residing in Dayton. Even though their mother tongue is Turkish and/or Russian, they speak mostly English outside of the home, at school or work. Most Meskhetian Turks are multilingual and have seen unexpected difficulties in education.

The Status of Science in Early Childhood

Early childhood education in the US covers birth to 8 years of age. In some countries, early childhood education is comprised of different ages. For example, in Turkey, there are schools for children ages 3 to 6 which is considered early childhood education. In Sweden, the early childhood age range is between 1 and 7: while France is form 4 to 6 and Belgium is 2.5 to 6 (Niron, 2011). Regardless of the country or age range, young children tend to be interested, inquiring, and imaginative. To support these skills, school environments should be created to support children as they ask and answer
questions, explore subjects that they are curious about and solve problems (Arnas, 2002). In early childhood education, science activities give more opportunities for children when they engage in science experiments that including a variety of scientific thinking skills that use inquiry and high level thinking skills (Bredekamp & Copple, 1997). With these activities, children also improve their math, language and writing skills.

1.2. Purpose of the Study

The main purpose of this study is to investigate and describe the attitudes of Turkish students toward science and science materials. This study will also explore the causal factors that influence students' attitudes toward science. This study aims to analyze such factors as the students’ gender, ages, learning style(s), success in science process, success in other activities, and the teachers’ years of teaching experience, frequency of using science activities, time of science activities, qualities of science corners and teaching style. The Child’s Attitude Toward Science (CATS) survey, developed by this researcher, will be used to collect data.

This survey is comprised of two parts. The first part focuses on teachers and their science teaching experiences. The second part of the survey asks teachers to provide information about students. The student focused part of the survey includes questions related to Earth and Space Science, Life Science, and Physical Science. The survey was created using the Ohio pre-k science standards and topics. According to the Finn and Magee, the state of Ohio science standards;

The Ohio preK-8 science standards are divided into three strands: earth and space science, physical science, and life science. For each strand, a series of topics are then presented. For instance, topics within the earth and space science strand include Earth’s
surface” and “cycles and patterns in the solar system.” These are followed by grade-specific standards, called “content statements.” For each content statement, the state provides a series of “content elaborations,” which are several-paragraph descriptions of how the content statements relate to those of previous and later grades. The content elaborations also provide more detailed descriptions of what students should know about each topic. (2012, p.141)

1.3. Research Questions

The purpose of this study was to identify Turkish students’ attitudes toward science. The research questions are: 1) What is the relationship between Turkish students’ genders and their attitudes towards science in early childhood education? 2) What is the relationship between Turkish students’ ages and their attitudes towards science in early childhood education? 3) What is the relationship between Turkish students’ learning style(s) and their attitudes towards science in early childhood education? 4) What is the relationship between Turkish students’ successes in the science process and their attitudes towards science in early childhood education? 5) What is the relationship between Turkish students’ successes in other activities and their attitudes towards science in early childhood education? 6) What is the relationship between Turkish students’ attitudes towards science and their teachers’ years of teaching experiences in early childhood education? 7) What is the relationship between frequency of using science activities in a week and Turkish students’ attitudes towards science in early childhood education? 8) What is the relationship between time of using science in a day and Turkish students’ attitudes towards science in early childhood education? 9) What is the relationship between qualities of science corners/centers in classroom and Turkish students’ attitudes towards science in early childhood education? 10) What is the
relationship between Turkish students’ attitudes towards science and their teachers’ teaching style(s) in science activities in early childhood education?

1.4. Significance of the Study

Kuenzi stated that “There is growing concern that the United States is not preparing a sufficient number of students, teachers, and practitioners in the areas of science, technology, engineering, and mathematics (STEM).” (2008, p.1) According to the Charlton Research Company for Research!America results (2011) American seventy four percent of participants say that Science, Technology, Engineering and Mathematic (STEM) Education is very important. Only two percent of participants say that STEM education is not important.

Figure 1.1

Importance of STEM Education

![Importance of STEM Education](image)
According to Gonzales, Williams, Jocelyn, Roey, Kastberg, and Brenwald, *Trends in International Mathematics and Science Study (TIMSS)* results show that at grade four, the average of U.S. science scores was higher than twenty-five of thirty-five countries and lower than four Asian countries (Singapore, Chinese, Hong Kong and Japan). The average of American eight graders’ science score was ranked eleventh out of forty-eight nations. Singapore, Japan, Czech Republic Hungary and Slovenia had good performance from American students in science assessment results (2008). In the same study, the average of grades four U.S. students in science, 2007 scores had three low scores from 1995. However the average of eight graders 2007 science scores had seven more score than 1995 science scores. Results were showing there are no significant differences in the science averages between U.S female and male students.

In 2007, TIMSS scale averages, U.S. White, Asian, and multiracial fourth graders score on average. However black fourth graders scored low performance in this assessment. Hispanic fourth graders average scores showed that there are no measurable differences. This results also similarly with eight graders (Gonzalez, et al, 2008). This result show that students, who are form different ethnic/racial groups, perform differently in science.

In Dayton, according to the Ohio Department of Education, Limited English Proficiency (LEP) status, ELL students have low proficient percentage scores in science. The proficient percentage scores of fifth graders who are not in LEP status are twenty-four point nine percentages. However students who are in LEP status have three point seven percentages in proficient. Results are also similar in other graders scores (2011).
This study investigates the attitudes of preschool students, who are from different ethnic groups, attitudes toward science and the causes of these attitudes in early childhood education. Early childhood education is the foundation of the students’ life and their personalities. If they spend time engaged in science, find answers to their scientific questions, they can develop positive attitudes towards science. Learning about students who come from different ethnic backgrounds, should be helpful for teachers when they create their curriculum in their classrooms. This review of the literature shows that the research on students’ attitudes towards science in early childhood education is limited. For older students, studies related to attitudes towards science and science education about teachers’, teacher candidates’ and students are more plentiful. For example, in a student of elementary school students, Foley and McPhee studied *Students’ Attitudes towards Science in Classes Using Hands-On or Textbook Based Curriculum* (2008). This study filled and important gap in this field and allowed researchers looked at the attitudes of different subgroups.
Kamay and Karker (2006) stated that early childhood is a great time when children improve important life skills and scientific skills when provided with quality experiences. In these years, experiences help children learn basic skills in cognitive and social areas. Children can use these new skills in their daily life and build on them for the future. Developing these skills in the early years forms the foundation for learning new academic conceptions in later years.

Teaching and learning science is an important but often overlooked aspect of young children’s educational experience. According to Lind (2000), helping children to improve science skills supports children not only to manage the events in daily life, but also helps them in future science and mathematics studies. The Program for International Students Assessment (PISA) 2009 results showed that 15 year old students from the U.S. had low average scores in science (OECD, 2010). Because science thinking develops overtime, it can be inferred that these results show that the American education system could benefit from improved science instruction in the early years.

According to the National Science Education standards, early childhood educators have goals that introduce young children to mathematics, science, technology, and
engineering (National Research Council, 1996). It is important for American education because early experiences affect later achievement. With this goal teachers can also help to improve child’s skills in literacy as well as study skills.

Worth (2010) stated that for many years, early care and education concentrated on children’s social, emotional, and physical development. Children rarely focused on scientific skills and experiences. This was a big problem for teachers when they taught science to children because they tend to be uncomfortable with science instruction and had weak science backgrounds.

American teachers are not the only teachers that have deficits in science teaching. The committee of Milli Egitim Bakanligi Talim ve Terbiye Kurulu Başkanlığı (Turkish Ministry of National Education) stated that science education is needed to help children in:

- Thinking scientifically
- Learning with hands on
- Improving observation and experiment skills
- Creating new inspirations
- Feeling self-confidence
- Physical development (2002).

2.1. Science in Early Childhood Education

Aktas stated that science teaching in early child education does not mean teaching scientific knowledge, but rather giving opportunities to children to learn this information by doing hands on activities as they make sense of their world (2002). One common
strategy to provide hands on experiences is the use of science corners that can be created for individual and group activities. Others state that science education needs to be more than a place in the classroom or a set of materials. It needs to be a mindset that encourages curiosity. Brenneman, Boyd, and Frede (2009) identified that it is important for science to be taught in early childhood years so that pupils have positive attitudes toward mathematics and science. These positive attitudes affect children’s future success in and out of school performance.

Many teachers have invalid preconceptions about science. They believe that science focuses on facts and knowledge about discoveries, technological accomplishments, or content knowledge that people memorize. But, from preschool to college years, science is used as a way of thinking and acting rather than memorizing or learning rote facts. In preschool years, children should learn how the everyday world functions with science activities (Lind, 2000).

French (2004) studied science as the center of a coherent, integrated early childhood curriculum. This researcher used an early childhood curriculum called ScienceStart! and worked with classroom teachers, doctoral students and other colleagues during 6 years to develop this curriculum. Between 1995 and 2001, 195 children were involved in this study. ScienceStart! was validated with the Peabody Picture Vocabulary Test (PPVT). The results show that:

The experience of implementing ScienceStart! in a number of preschool classrooms has shown that a focused and structured approach to science instruction at the preschool level is possible and can lead to enhanced knowledge about the surrounding world, internalization of a systematic approach to asking and answering questions about “how
the world works,” and enhanced development in the critical areas of language and early literacy. (French, 2004, p.147)

Worth (2010) said that early childhood education gives rich opportunities to children for early thinking and learning. With a rich environment, guided by skillful teachers, children’s experiences in the early years can have significant impact on their later educational achievement. That is why science may be a particularly important domain in early childhood, serving not only to build a basis for future scientific understanding but also to build important skills and attitudes for learning. Jones and Courtney (2002) stated in their research that early childhood classrooms are appropriate places for children to make scientific discoveries. That is why preschool teachers can create their classrooms for everyday experiences because children like to explore how seeds are planted, living animals interact, and objects work.

2.2. The Basics of Science Process

When children improve their science process skills they can be successful in areas which need critical thinking. Lind (1996) classified science process skills in three main groups: basic process skills (observing, comparing, classifying, measuring, and communicating), intermediate process skills (inferring and predicting), and advanced process skills (hypothesizing, defining and controlling variables). Vitti and Torres explained the scientific process:

The science process occurs naturally, spontaneously in our minds. By logically breaking down the steps in our thinking, we can use the science process to find out how to answer our questions about how the world works. The science process is not just useful in science, but in any situation that requires critical thinking.
The science process skills include observing qualities, measuring quantities, sorting/classifying, inferring, predicting, experimenting, and communicating. (2006, p.3)

Lind also stated that for preschool and the primary grades, basic process skills are more suitable than intermediate and advanced process skills (2000).

2.2.1 Observing

Lind, (1996) stated that one science process skill is observation. In this process, children use their sense of sight, smell, sound, touch, and taste skills when they identify objects. Children learn that collecting information as the first step in problem solving. That is why giving different kinds of observable properties of objects such as shapes, sizes, colors and textures is important for improving observation skills (p. 47-48).

Gelman, Brenneman, Macdonald and Román checked how the Preschool Pathways to Science (PrePS) program, which is created by researcher, works in early childhood education classroom. PrePS created for deep and long term effects in children’s future education. This program gives more opportunities and pays attention to repeating classroom opportunities for children in the science process. Researchers studied 3 and 4 year old children who were mostly ESL students. The children whose teacher used the PrePS program showed significant important improvement in their posttest (79% of learners versus 27% in the classroom comparison). Researchers also found similarly positive results with 4 year old children in a larger study (2010). This study showed that having observational tools available benefits students and increases observational skills.
2.2.2 Comparing

Children naturally start to compare objects noting similarities and differences as they improve their observation skills. That is why comparing looks like the first stage of classifying. Teachers should strive to provide more opportunities comparing (Lind, 1996, p. 48). Children should be given many different and similar objects that can be sorted by color, shape, size of objects.

2.2.3 Classifying

Lind explained that classifying skills begins by grouping and sorting. Children use their observation skills while exploring the characteristics of objects. First they group objects by one property such as color or size or shape. After mastering sorting by property, children begin sorting by two or more characteristics of objects (1996, p. 48).

2.2.4 Measuring

According to the Lind (1996), measuring is a way of quantifying observations. It can include number, distance, times, and volume. Children can use standard and nonstandard units when they measure. For example, “The book is 12 beans long” is one of the nonstandard units (p.49).

2.2.5 Communicating

In early childhood, children use ideas, directions, and descriptions orally or in written forms such as pictures, maps, graphs, and reports when they explain their scientific explorations. Communicating is important for children to explain information and understand what they mean (Lind, 1996, p.49).
Gelman et al. (2010) studied with 44 four and five year old children when they investigated children’s ability to interact with materials and generate a simple procedure to test questions. For this study they used pretests and posttests. They found that 36 children’s scores changed. In these results, 75% improved and 25% did worse than the children’s pretest. They stated the PrePS program is benefit for children’s individual learning.

Downing and Filer (1999) investigated what relationships between preservice elementary teachers’ competency in science process skills and their attitudes toward science field of science. Researchers used the Test of Integrated Process Skills II (TIPSII) and the Fenneman-Sherman Mathematics Attitudes Scales (SAS) instruments. Data of study was collected from 46 students who studied math and science methods in their senior semester before students teaching. Studies results indicated that there was a significantly positive relationship between levels of science process and attitudes toward science.

Ozturk (2010) studied 5 teachers and gave them pre and post interviews to evaluate their opinion about science process skills and children’s science learning experiences. The researcher found that according to the participant teachers, science process skills (observing, comparing, classifying, measuring, and communicating) are beneficial for children when children improve their knowledge from real life experiences.
2.3. Science Content Areas

According to the committee of National Research Council (1996), “Students need knowledge and understanding in physical, life and earth and space science to apply science.” (p.102). The committee also divided science into eight categories;

- Unifying concepts and processes in science.
- Science as inquiry.
- Physical science.
- Life science.
- Earth and space science.
- Science and technology.
- Science in personal and social perspective.
- History and nature of science (1996).

Lind explained that there are four main science areas in early childhood education. Those are physical science, earth and space science, life science, and health science (2000). Finn and Magee stated in the State of State The Science Standards (2012), that in the United States each state uses its own science standards and these standards come from three main strands; Physical science, Life science, and Earth and Space science.

2.3.1. Physical Science

Allen stated that physical science is about the study of properties and exploration of matter, objects, energy, movement and change in early years (2002). Physical science gives more opportunities to children for observing changes and movements of stars, planets, and the sun. The National Research Council (2012) explained that physical science can help students’ understanding devices of cause and effect in all systems and
process. For physical science, the committee developed four disciplinary main ideas. These are:

PS1: Matter and Its Interactions

PS2: Motion and Stability: Forces and Interactions

PS3: Energy

PS4: Waves and Their Applications in Technologies for Information Transfer (p.103)

Finn and Magee stated in *The State of the State Science Standards* (2012), that for Ohio states, physical science is offered with narrative form rather than lists of content and results is a clear explanation of vital content.

2.3.2. Earth and Space Science

Lind clarified Earth and Space Science (ESS) as including the exploration and understanding of earth materials, changes in earth and sky objects, air and water, sand and soil, day and night patterns, and seasons (2000). Earth and Space science is simplified and tried to teach with understandable scientific substances and words for early grades in Ohio (Finn & Magee, 2012). The National Research Council (2012) stated ESS processes have content about the Earth and its place in the solar system and galaxy. They also explained that ESS has common branch with other areas such as physical and life science. The National Research Council developed some core ideas for ESS; which include are

ESS1: Earth’s Place in the Universe

ESS2: Earth’s Systems
2.3.3 Life Science

Allen stated that exploration of senses, investigation of living and nonliving things, characteristics of organisms, life cycles, and environments are included in Life Science (2002). Lind focused on Life Science Concepts including living things, seeds and plants and animals (1996). The State of the State Science Standards (2012) described life science as follows:

The life sciences focus on patterns, processes, and relationships of living organisms. Life is self-contained, self-sustaining, self-replicating, and evolving, operating according to laws of the physical world, as well as genetic programming. Life scientists use observations, experiments, hypotheses, tests, models, theory, and technology to explore how life works. (p.139)

These standards include four core ideas for Life Science as follows:

LS1: From Molecules to Organisms: Structures and Processes
LS2: Ecosystems: Interactions, Energy, and Dynamics
LS3: Heredity: Inheritance and Variation of Traits
LS4: Biological Evolution: Unity and Diversity (Finn & Magee, 2012, p.140)

2.4. Importance of Science

According to the researchers at the Center on the Developing Child at Harvard University (2007), early experiences help children’s brain development and offer strong or weak foundations for all future learning, behavior and health development (p.3). Lind (2000) stated that improving science skills benefits children not only managing in daily life skills but also benefit children’s future science and mathematics studies. According to
the National Science Education Standards, science helps children be a successful and happy in their education life. They also stated that Americans need to improve scientific thinking and questioning. (1996).

The importance of science for children is listed by Milli Egitim Bakanligi Talim ve Terbiye Kurulu Başkanlığı in the Turkish education system (2011). The committee stated that with using science activities in classroom;

- Children improve scientific thinking
- Children find more chances for learning with hands on
- Children develop observation and experiment skills
- Children be sensitive toward environment
- Children improve their creativeness skills
- Children expand their self confidence
- Children develop scientific information for their future education
- Children improve their cooperative working, sharing, welfare, and physical skills (p.7-8).

French’s study results showed that the scores of eight low income students’ improved from pretest to post test results. The researcher studied two different groups between 2000 and 2001. Children who attended ScienceStart! classes had significant differences between pretest and post test scores. Researcher also took parents and teachers opinions about their children’s situation and found that many parents gave good comments about their children’s speaking skills about colors, playing in the backyard and scientific thinking. Teachers also gave positive responses for their children’s developing skills on the class participating, decreasing misbehaving, and using words (2004).
Durdu studied 57 students including 20 girls and 37 boys who attended kindergarten in Malatya, Turkey in 2008-2009. The researcher used pre and posttests for two experimental and one control groups. Durdu examined pre-school children’s cognitive development and achievement after intensive science education program. The results showed that children who participated in the intensive science education program had higher cognitive development than the children who engaged in in traditional education program (2010). The researcher emphasized that children’s cognitive development has a long term effect on science education.

2.5. Goals of Science

Worth (2010) believed that the goals of science are to understand the natural world with scientific knowledge. This knowledge helps to answer natural questions about their world including such topics as understanding why water evaporates, how plants grow in particular locations, and how electricity works. Eshach and Fried (2005) studied a question about why we should teach science to K-2 students and found six reasons for teaching science in early childhood including:

1. Children naturally enjoy observing and thinking about nature.
2. Exposing students to science develops positive attitudes towards science.
3. Early exposure to scientific phenomena leads to better understanding of the scientific concepts studied later in a formal way.
4. The use of scientifically informed language at an early age influences the eventual development of scientific concepts.
5. Children can understand scientific concepts and reason scientifically.
6. Science is an efficient means for developing scientific thinking (p.319).
Milli Egitim Bakanligi Talim ve Terbiye Kurulu Başkanlığı (2011) explained some goals of science and education for children:

- Support children for problem solving skills,
- Encouraged children for developing creativeness,
- Helped children’s developing physical, cognitive, social-emotional and self-care skills,
- Support children for thinking and understanding of causes and effects of an event,
- Encouraged children to interest with science and scientific ideas,
- Helped children for readiness for regular class (p. 5).

The goals of science in early childhood education were explained under four main subtitles: 1) improving problem solving skills with using science process, 2) helping to develop scientific thinking, 3) teaching to learn knowledge about nature with science literature, and 4) effect children to natural events (Şahin, 2000, p.62-63)

2.6. Teachers’ Roles in Science Teaching

In education, teachers play important role in establishing quality of education programs, environments, and educational tools. That’s why teachers have very big responsibilities and significant roles in education. According to the Houte, Desmet, and Devliger (2012), teacher education programs show some differences country to country and these differences affect teachers’ work in preschool and primary classroom. Researchers investigated this study in nine European countries (Belgium, Finland, France, Germany, Greece, Malta, Portugal, Romania, and the UK). In investigating these differences, each researcher had to add e-materials in the online Dropbox system, had to develop bibliographic lists (policy and research) and had to develop rubric documents
(policy and research). Researchers paid attention to two main topics; first, initial teacher education and professional development and second, pre-k and primary teachers’ relation to science and/or mathematics education. Researchers emphasized teachers’ standards in England and Finland. England had three main areas: professional skills; professional knowledge and understanding. However, these changed with new standards in 2012 which now include:

1) Set high expectations which inspire, motivate and challenge pupils 2) Promote good progress and outcomes by pupils 3) Demonstrate good subject and curriculum knowledge (which includes ‘if teaching early mathematics, demonstrate a clear understanding of appropriate teaching strategies’) 4) Plan and teach well-structured lessons 5) Adapt teaching to respond to the strengths and needs of all pupils 6) Make accurate and productive use of assessment 7) Manage behavior effectively to ensure a good and safe learning environment 8) Fulfill wider professional responsibilities.(p.22)

In Finland, teachers, who work in pre-k, primary, and secondary levels of education, need to have degrees in teacher education. However, this degree reexamined and described as 3 groups and 10 subgroups of competences:

- the teacher as a guide of learning- and development processes;
- the teacher as an educator;
- the teacher as a (subject - content) expert;
- the teacher as an organizer;
- the teacher as an innovator / researcher;
- the teacher as a partner of parents;
- the teacher as a partner of the school team;
- the teacher as a partner of the external community;
the teacher as a member of the educational community;
the teacher as a participant of the cultural community. (p.23)

The committee of National Science Education Standards stated (1996) that “When teachers treat students as serious learners and serve as coaches rather than judges, students come to understand and apply standards of good scientific practice” (p.88). The committee also explained that effective teaching is heart of science education so good teachers should create environment for them and their students’ active learning and teaching.

According to the Karamustafaoglu and Kandaz (2006) teachers should encourage students to participate to science activities. Teachers should give chances for students to do basic level of science experiments that incorporate the active learning process. During this time, with using different teaching styles depending on the subjects, teachers can help to improve students’ interest toward science and nature.

Milli Egitim Bakanligi Talim ve Terbiye Kurulu Başkanlığı stated that, teachers have a significant role in science activities. Teachers should have positive attitudes regarding science and create rich environments in classrooms. Teachers should encourage children to ask and answer questions. Teachers should answer or find answers to the questions of children about nature and/or science. During science activities, teacher can use science process such as observing, classifying, and inferring with children to find child’s questions (2011).

Kildan and Pektas studied 52 pre-k teachers who worked between 2007 and 2008 Kastamonu, Turkey. They used the interview methods for collecting data. They found that some of their participants stated in early childhood education, science activities do
not support child’s scientific developments. Cause of this reason is not science topics in education program. It is teachers’ negative roles and negative attitudes in scientific activities (2009).

Conezio and French (2002) stated that some teachers want to use more science activities in education programs. However they really don’t know how they can do that. In early childhood education, teachers, who know what science is and how they can take advantage of science, can easily use science activities with their other activities such as language, art, math.

Tu (2006) investigated 20 preschool science environments for three to five year old children in 13 Midwestern child care centers. Tu used The Preschool Classroom Science Materials/Equipment Checklist, the Preschool Classroom Science Activities Checklist, and the Preschool Teacher Classroom/Sciencing Form for the study to collect and analyze data. The study showed that half of the preschool classroom had science area. The activities that the preschool teachers engaged were mostly unrelated to science activities (86.8%), 4.5% of the activities were related to formal science teaching, and 8.8% of the activities were related to informal science teaching. Tu suggested that teachers need to use more on their own practice and utilize science tools for improving science teaching in preschool classrooms.

Hall (2010) discussed the influence of David and Frances Hawkins and educators from Reggio Emilia and distinguished between “making a mess” and “messing about.” In this study, the researcher tried to answer the question, “What professional development in early childhood science will meet the requirements of practicing teachers?” The
researcher preferred six main ways that early childhood science teachers and professionals need to do for support children’s development. Those are;

- Be ongoing.
- Recognize and respect
- Provide space
- Be closely connected to ongoing investigations
- Utilize resources from the scientific community and from the political, economic, and cultural communities.
- Provide a forum.

2.7. Multiculturalism in Science

Powers and Stansfield (2009) concluded that there are no differences in teaching science to ELLs and general education students. The main differences come from ELL’s language skills while informing science (p.12). The National Science Education Standards (1996) stated that standards related to all students who come from different ages, cultural or ethnic backgrounds, disabilities, objects, and interests in science. Committee guided some principles under this topic. Those are:

- Science is for all students.
- Learning science is an active process.
- School science reflects the intellectual and cultural traditions that characterize the practice of contemporary science.
- Improving science education is part of systemic education reform (p.19).

Bryan and Atwater (2002) studied teachers’ beliefs about multicultural issues and their impact on science teaching and learning. They discussed three core ideas for
deciding what teachers’ believe in their research: (a) student characteristics; (b) external influences on learning; and (c) appropriate teacher responses to diversity (p.827). Researchers decided that to know teachers’ beliefs about teaching science in classroom is a significant part when teaching science to ELL students.

Valadez and Moineau (2010) studied parents and students who are English Language Learners. They conducted a 5 year project and created a curriculum that is about culturally sensitive science education for these groups. During their research they worked with 414 parents and 146 students between 2004 and 2009. They found that students had highly positive changes in their education and found how teachers can effectively teach science to ESL parents and students.

Kopriva (2009) studied ELL students’ assessing skills and abilities in math and science. The researcher used Obtaining Necessary Parity through Academic Rigor (ONPAR) and worked with approximately 1000 students from eight districts in three states with grades four and eight participating in the study. ELLs at English proficiency levels 1-3, based on the ACCESS for ELLs™ English Proficiency Test, were the focal group, ELLs with proficiency levels 4 and above were an exploratory group, and nonELLs were the control group. The researcher found that there were significant differences between how low language (LL) ELLs and non- ELLs performed on the traditional test, there was no significant difference between the LL ELLs and the nonELLs on the ONPAR test (p.9-10).

2.8. Attitudes toward Science and Science Education

Papanastasiou and Papanastasiou (2004) investigated the attitudes of eighth grades students toward science in Australia, Canada, Cyprus, and Korea. They used the
Third International Mathematics and Science Study (TIMSS) data in their study. They selected these countries because of location, size, population, achievement, and attitudes. They collected all data from all four countries at the end of the 8th month of the academic years of schools. Fifty-five schools from Cyprus, 161 from Australia, 367 from Canada, and 150 from Korea participated in this study. These included 2923 students from Cyprus, 7253 from Australia, 8362 from Canada, and 2920 from Korea. The researcher used a survey method for this work. Results show that Cyprus was one of the smallest countries had a very high proportion of students with positive attitudes toward science. Korean students had a proportion of students with positive attitudes toward science. Canadian and Australian students had an intermediate proportion of students with positive attitudes toward science (that is lower than Cyprus students, higher Korean than students).

Varley, Murphy, and Veale (2008) worked with 1530 students who were different ages and grades. They used a survey method for taking students’ attitudes toward school and science. The returns numbered 1030, and they were coded for protecting participants’ rights. For school science, results showed that 55% of pupils found school science interesting, and 43% of pupils found science was easy. Researchers also stated that some pupils didn’t enjoy science because it was too difficult. Some students appeared to enjoy science because it was challenging. Thirty percent of people appeared to like science better than other subjects. As a result of research, pupils have positive attitudes about school life and towards school science (p.43-45).

Adamson, Foster, Roark, and Reed (1998), reported a case study about starting of gender differences in doing science. Data were collected during 2 years of science for
children in Grades 1-6 a progressive private school. 230 and 259 students in elementary school enrolled during year 1 and year 2 of the study. Children separated into nine classrooms, and ear with between 28 and 30 students, half boys and half girls. Researcher grouped students in to two levels of grades: lower (Grades 1-3; ns = 106 and 110, year 1 and year 2, respectively) and upper (Grades 4-6; ns = 124 and 149) elementary school. Approximately 20% of the students are ethnic minorities and predominantly African-Americans. Families were drawn middle and upper middle class by school. 268 projects were characterized terms of achievement and area of science. Researcher took parents’ information about children’ selected and created projects. Researchers stated that after two years, boys tented to work in the physical sciences and girls in the biological and social science.

Cakmak (2006) worked with teacher candidates who are studying seniors in seven different universities in Turkey and investigated their attitudes towards science and its relationship between their teaching and understanding levels of some science concepts. The participants were 231 preschool teacher candidates. All data were collected by three different instruments, Science Attitude Scale (SAS), Science Teaching Attitude Scale (STAS) and Science Concepts Test (SCT). Results were shown that candidates had positive attitudes toward science. There was a statistically significant relationship between teacher candidates’ attitudes toward science and their teaching and understanding of some science concepts.

Yoo (2010) selected four early childhood educators for a case study. Portfolios were used and each teacher used for their science activities. Results showed that teachers were able to empower risk-taking attitudes regarding their learning and teaching science
when they teach early science fields in classroom. Study shown that early childhood teacher had positive attitude toward science than before. Teachers, who had more positive attitude toward science, performed in understanding children’s curiosity about science better than what these teachers expect. These results were coming from development of portfolio during the science method.

Adak (2006) investigated the relationship between early childhood teachers’ attitudes toward science teaching and their thinking styles. For this study, researcher used three different instruments: Science Attitudes Scale by Cho, Thinking Styles Scale by Epstein, and Demographic Questionnaire by researcher. The participants of this study was 186 public and private school early childhood teachers in the down town of Denizli, Turkey. Researcher found that teachers had positive attitudes toward science teaching. Researcher stated that taking science classes during undergraduate degree and teachers’ attitudes toward science teaching had significantly important relationship; however there is no meaningful relationship between teacher’s attitudes toward science teaching and problems that occurs teaching science while teaching science.

Sönmez (2007) studied preschool teachers’ attitudes toward science teaching and its impact practices and science activities in classroom. Researcher investigated impacts of teachers’ attitudes toward science such as educational level, teaching experience, undergraduate course work on science, in service training, number of children in classroom and age of children. For this study researcher used Childhood Teacher’s Attitudes toward Science Teaching Scale (ECTASTS) AND worked 292 preschool teachers who worked I public and private schools in different districts of Ankara, Turkey during the second semester of 2006-2007 academic years. Results showed that there was
statistically significant relationship between teachers’ attitudes toward science and science activities. Teachers’ altitudes had positive effects from all factors except age and in service training.
CHAPTER 3
RESEARCH METHODOLOGY

3.1. Design of the Study

The target of this research was to investigate attitudes of Turkish children toward science and science topics in preschool and kindergarten levels. The second purpose of this study was to explore the causal factors that had relationships with Turkish students' attitudes towards science. Child’s Attitude Toward Science (CATS) survey, as developed by this researcher, was used to collect teachers opinion about their Turkish students’ attitudes towards science in early childhood education. Although data was collected from teachers, the research was focused on understanding how Turkish students’ attitudes regarding science.

3.2. Characteristics of Participants

Participants included Turkish children who studied in XX School and YY School during fall semester of 2012, both located in Dayton, Ohio. These schools were selected for the current study because both schools have reported large Turkish student populations. To investigate children’s abilities and attitudes in science, 4 teachers from XX and 2 teachers from YY schools completed surveys.
Teachers reported 44 surveys for their Turkish students in both preschool and kindergarten grades. Turkish children, who are also called Meskhetian (Ahiskan) Turks, use English at school and Turkish and Russian at home. According to Cingi (2012), the main reason for speaking Turkish and Russian language at home is due to Turkish parents’ lack of English skill. All 6 teachers were American. They were speaking English in the classroom. They all had student teaching experience but had limited school experience with Turkish students. Teachers were rewarded with a $15 gift certificate for participating in this study.

3.3. Instrument

The Child’s Attitudes Toward Science (CATS) survey was developed by this researcher. There were two parts in the survey. The first part inquired into the child’s attitudes toward science topics. There were 24 items; in the first half, there are 5 items about the child’s age, gender, learning style (linguistic, logistic, physical, visual), success in science process (observing, measuring, classifying) and success in other activities (language, math, art). For success in science process and in other activities, items were evaluated as “one of the worst” “below average”, “average”, “above average”, “one of the best”. In the second half, nineteen items were comprised by three main subtopics (Earth and Space Science, Life Science, and Physical Science). The second half was related to the child’s interest in the selected topic. This half used a 6 point scale. Each item was evaluated with “not observed”, “never”, “rarely”, “sometimes”, “most of the time”, and “always”. Questions were categorized with their interest topics. Earth and Space Science was covered by questions 1 through 6. These 6 questions were related to Earth and Space Science topics such as natural events, day and night patterns, and law of
gravity. Life Science was covered by questions 7 through 13. These 7 questions were related to life science topics such as food chain, habitats, animals, plant. Physical Science was covered by questions 14 through 19. These 6 questions were about physical science topics such as states of matter, forces and motions, blocks, magnets, and light. The second part of the survey was comprised by 7 items about teacher and curriculum. Items reported Turkish students’ class size, teacher’s experience with Turkish students, frequency of science activities, time in science activities, teaching methods, qualities of science center or area, and materials in science areas. Qualities of science center/area were evaluated with “very poor”, “poor”, “fair”, “good”, and “very good”. Time of science activities scale was evaluated with “morning”, “mid-morning”, “afternoon”, and “mid-afternoon”.

3.4. Validity of the Scale

The validity of the scale was tested in terms of content and construct validity. The content validity was evaluated by two areas; early childhood education and science education. Validity of scale was tested by professionals. After each scale was created, the survey was delivered to 24 undergrad students who were studying Early Childhood Education at the University of Dayton. This pilot test was used to evaluate whether items were readable and understandable. After the pilot test, some items and questions were altered.

3.4. Reliability of the Scale

The pilot test was used for determining the reliability of survey. Item total correlations and cronbach alpha values are obtained. The results of reliability test showed a cronbach’s alpha value of .71. In most social science research, for acceptable
reliability of scale, cronbach alpha values should be .70 or higher. All items of this survey were tested for correlation. The findings of the correlation test showed that all items had approximately similar effect to cronbach alpha values and all items had significant correlation between each other.

3.5. Data Analysis

The researcher used descriptive demographic information of participants and their classroom; according to the teachers teaching experience, teaching style, frequencies of using science activities, time of science activities in a day, and qualities of science centers/areas (see Table 4.1 thorough Table 4.5). Students’ demographic information was reported according to their gender, age, learning style, success in science process and success in other activities. Frequency and percent tables were used for showing data (see Table 4.6 through Table 4.10).

The researcher used an independent samples t-test to examine the relationship between Turkish students’ gender and their attitudes towards science. A one-way ANOVA was used with a Tukey Post Hoc to examine the relationships of Turkish students’ attitudes towards science on the other 9 variables (students’ ages, learning style, success in science process, and frequency of using science activities in a week). The level of significance was set at .05.

3.6. Hypothesis

The following hypotheses were investigated in the present study.

Hypothesis 1: There is a relationship between Turkish students’ gender and their attitudes towards science in early childhood education.
Hypothesis 2: There is a relationship between Turkish students’ ages and their attitudes towards science in early childhood education.

Hypothesis 3: There is a relationship between Turkish students’ learning style(s) and their attitudes towards science in early childhood education.

Hypothesis 4: There is a relationship between Turkish students’ attitudes towards science and their successes in the science process in early childhood education.

Hypothesis 5: There is a relationship between Turkish students’ successes in other activities and their attitudes towards science in early childhood education.

Hypothesis 6: There is a relationship between Turkish students’ attitudes towards science and their teachers’ years of teaching experiences in early childhood education.

Hypothesis 7: There is a relationship between frequency of using science activities in a week and Turkish students’ attitudes towards science in early childhood education.

Hypothesis 8: There is a relationship between times of using science in a day and Turkish students’ attitudes towards science in early childhood education.

Hypothesis 9: There is a relationship between qualities of science corners in classroom and Turkish students’ attitudes towards science in early childhood education.

Hypothesis 10: There is a relationship between Turkish students’ attitudes towards science and their teachers’ teaching style(s) in science activities in early childhood education.
CHAPTER 4
RESULTS OF THE STUDY

4.1. Demographic Information of Participants and Characteristics of Their Turkish Students

Presented in the table frequencies and percents for teaching experience, frequencies of using science activities in a week, time of science activities in a day, teaching style, and qualification of science corners/areas are (see Table 4.1 through Tables 4.5). Teachers reported data for a total of 44 Turkish students (N=44). Tables also present the frequencies and percents for students’ ages, learning style(s), success in science process, and success in other activities. All tables are comprised by data based on the Turkish students (N=44) in preschool and kindergarten classrooms (see Tables 4.6 through Tables 4.9).

4.1.1. Demographic Information about Participants and Their Classrooms

As noted before, the surveys were sent to two schools before the conclusion of the fall semester. Six teachers, two of them were preschool teachers and 4 of them were kindergarten teacher, all teachers were female (N=6). Teachers experience with Turkish students included 1 teacher having less than 6 month, 4 teachers having 3-4 years, and
a teacher having more than 4 years teaching experience with Turkish students (see Table 4.1).

Table 4.1

*Frequencies and Percents for Teacher’s Experience with Turkish Students (N=44)*

<table>
<thead>
<tr>
<th>Teaching Experience</th>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6 month</td>
<td>14</td>
<td>31.8</td>
<td></td>
</tr>
<tr>
<td>7 month - 12 months</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>13 months - 2 years</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>3-4 years</td>
<td>23</td>
<td>52.3</td>
<td></td>
</tr>
<tr>
<td>More than 4 years</td>
<td>7</td>
<td>15.9</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2

*Frequencies and Percents for Frequencies of Using Science Activities in Classrooms (N=44)*

<table>
<thead>
<tr>
<th>Frequency of Science Activities</th>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 2 times</td>
<td>8</td>
<td>18.2</td>
<td></td>
</tr>
<tr>
<td>3-4 times</td>
<td>9</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>5-6 times</td>
<td>19</td>
<td>43.2</td>
<td></td>
</tr>
<tr>
<td>More than 7 times</td>
<td>8</td>
<td>18.2</td>
<td></td>
</tr>
</tbody>
</table>

The majority, 43.2% (n=19) of students, engaged science activities 5-6 times in a week. Table 4.2 presents frequencies and percents for students’ numbers. Table 4.3 displays frequencies and percents for using science activities in a day. The majority 31.8% (n=14) of students engaged in science activities in morning.
Table 4.3

*Frequencies and Percents for Time of Using Science Activities in A Day (N = 44)*

<table>
<thead>
<tr>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>14</td>
<td>31.8</td>
</tr>
<tr>
<td>Mid-morning</td>
<td>9</td>
<td>20.5</td>
</tr>
<tr>
<td>Afternoon</td>
<td>8</td>
<td>18.2</td>
</tr>
<tr>
<td>Mid-afternoon</td>
<td>13</td>
<td>29.5</td>
</tr>
</tbody>
</table>

Table 4.4

*Frequencies and Percents for Teaching Style (N = 44)*

<table>
<thead>
<tr>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hands on activities</td>
<td>14</td>
<td>31.8</td>
</tr>
<tr>
<td>Play based curriculum</td>
<td>14</td>
<td>31.8</td>
</tr>
<tr>
<td>Text books</td>
<td>11</td>
<td>25.0</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>11.4</td>
</tr>
</tbody>
</table>

Table 4.4 shows frequencies and percents of teaching style(s) that teacher use in their classroom when they teach science. Teachers were expected to select one answer that was the teaching style used frequently in science. The majority, 31.8% (n=14) of Turkish students’ teachers believed their teaching style was hands on activities, while 31.8% (n=14) of the Turkish students’ teachers believed their teaching style was play based curriculum. Table 4.5 displays qualities of science corners/areas that Turkish
students’ have in their classroom. The majority, 50% (n=22) of students, had fair science corners/areas in their classrooms.

Table 4.5

*Frequencies and Percents for Qualities of Science Corners/Areas (N = 44)*

<table>
<thead>
<tr>
<th>Qualities of Science Corners/Areas</th>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poor</td>
<td>5</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>5</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>22</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>12</td>
<td>27.3</td>
<td></td>
</tr>
</tbody>
</table>

4.1.2. Demographic Information of Students’ Characteristics

Data was collected for 44 Turkish students’ ranging in preschool to kindergarten level. Teachers reported 21 data for preschool and 23 data for kindergarten groups. Data were collected for 25 male and 19 female Turkish students.

Table 4.6

*Frequencies and Percents for Students’ Ages (N = 44)*

<table>
<thead>
<tr>
<th>Age</th>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger than 3 years</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>4-5 years</td>
<td>32</td>
<td>72.7</td>
<td></td>
</tr>
<tr>
<td>6-7 years</td>
<td>12</td>
<td>27.3</td>
<td></td>
</tr>
<tr>
<td>Older than 7 years</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.6 displays frequencies and percents for age range. The majority, 72.7% (n=32) of Turkish students, were between 4 and 5 years old ages. Table 4.7 shows frequencies and percents for Turkish students learning style(s). For this variable, the teachers were expected to select one answer that describes the learning style of a specific child. The majority, 38.6% (n=17) of Turkish students, as reported by the teachers, had a learning style that was physical.

Table 4.7

Frequencies and Percents for Students’ Learning Style(s) (N = 44)

<table>
<thead>
<tr>
<th>Child’s learning style(s)</th>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical</td>
<td>5</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Verbal</td>
<td>9</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>17</td>
<td>38.6</td>
<td></td>
</tr>
<tr>
<td>Visual</td>
<td>12</td>
<td>27.3</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2.3</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.8

Frequencies and Percents for Students’ Success in Science Process (N = 44)

<table>
<thead>
<tr>
<th>Child’s success in science process</th>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the worst</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Below average</td>
<td>14</td>
<td>31.8</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>17</td>
<td>38.6</td>
<td></td>
</tr>
<tr>
<td>Above average</td>
<td>9</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>One of the best</td>
<td>4</td>
<td>9.1</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.8 demonstrates frequencies and percents for child’s success in science process such as observation, classification, and measurement. The majority 38.6% (n=17) of Turkish students had average scores when they engaged science activities in classroom. Table 4.9 displays frequencies and percents for Turkish student’s success in other activities such as language, art, and math. The majority 40.9% (n=18) of students had below average scores when they were in other activities.

Table 4.9

<table>
<thead>
<tr>
<th>Valids</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child’s success in other activities</td>
<td>One of the worst</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Below average</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Above average</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>One of the best</td>
<td>3</td>
</tr>
</tbody>
</table>

4.2. Analyzing of Research Hypothesis

All hypotheses were tested by using SPSS 19. The researcher was investigating relationships between Turkish students’ attitudes towards science and their teachers’ teaching experience, frequency of using science activities, time of science activities, qualification of science centers/areas, students’ genders, students’ ages, students’ learning style(s), students’ success in science process and students’ success in other activities. During statistical analyses, significance level was set at as .05.
Table 4.10 displays frequency and percents for children’s attitudes towards science and science areas. In Table 4.10, data were coded as ESS (Earth and Space Science), LS (Life Science), PS (Physical Science), and COMP (Composite score for all areas). In Table 4.10, data shows children’s attitudes towards science. The classification “Not Observed” means didn’t observed (does not mean shows anything or low attitudes). “Always” means “child has very positive attitudes” and “Never” means “child does not have any attitudes” toward science. Teachers reported 19 attitudes for specific students. That mean is 836 attitudes were reported by teachers for 44 students. The majority 33% (n=277) of children’s attitudes in whole science areas was not observed by the teachers. For observable attitudes: “Never”, “Rarely”, “Sometimes”, “Most of time”, and “Always”, the majority 22% (n=182) of children’s attitudes in whole science areas were reported as, “Sometimes” was by teachers for describing Turkish students’ attitudes toward science. According to Table 4.10, Turkish students had very positive attitudes toward LS. They showed positive attitudes toward PS and ESS.

Table 4.10

<table>
<thead>
<tr>
<th>Valids</th>
<th>ESS</th>
<th></th>
<th>LS</th>
<th></th>
<th>PS</th>
<th></th>
<th>COMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
<td>%</td>
<td>F</td>
</tr>
<tr>
<td>Not Observed</td>
<td>102</td>
<td>39</td>
<td>89</td>
<td>29</td>
<td>86</td>
<td>33</td>
<td>277</td>
</tr>
<tr>
<td>Never</td>
<td>5</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Rarely</td>
<td>19</td>
<td>3</td>
<td>33</td>
<td>3</td>
<td>31</td>
<td>12</td>
<td>83</td>
</tr>
<tr>
<td>Sometimes</td>
<td>67</td>
<td>25</td>
<td>67</td>
<td>22</td>
<td>48</td>
<td>18</td>
<td>182</td>
</tr>
<tr>
<td>Most of Time</td>
<td>39</td>
<td>15</td>
<td>66</td>
<td>21</td>
<td>58</td>
<td>22</td>
<td>163</td>
</tr>
<tr>
<td>Always</td>
<td>32</td>
<td>12</td>
<td>47</td>
<td>15</td>
<td>35</td>
<td>13</td>
<td>114</td>
</tr>
</tbody>
</table>
Hypothesis 1: There is a relationship between Turkish students’ gender and their attitudes towards science in early childhood education.

In order to investigate the relationship between Turkish students’ gender and their attitudes towards science in early childhood education, an Independent Samples T-Test was used. According to the results, Turkish students had no significant relationship between Turkish students’ genders in regards to their attitudes towards science in early childhood education.

Hypothesis 2: There is a relationship between Turkish students’ ages and their attitudes towards science in early childhood education.

An one-way ANOVA was used in order to investigate the relationship between Turkish students’ ages and their attitudes toward science in early childhood education. The findings of the one-way ANOVA are displayed in Table 4.11. The results \([F(1, 42) = 0.65, p>0.05]\) showed that Turkish students didn’t show significant relationship between their ages and their attitudes towards science.
Hypothesis 3: There is a relationship between Turkish students’ learning style(s) and their attitudes towards science in early childhood education.

To test the relationships between Turkish students’ leaning style(s) and their attitudes towards science in early childhood education, one-way ANOVA was tested. The results of the ANOVA are presented in Table 4.12. According to the results \[ F (4, 39) = 1.12, p>.05 \], Turkish students didn’t have significant relationship between their learning styles and their attitudes towards science in early childhood education.
Table 4.12

Results of ANOVA Scores of Student’s Attitudes Toward Science According to their Learning Styles (N = 44)

<table>
<thead>
<tr>
<th>Valids</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical</td>
<td>5</td>
<td>68.00</td>
<td>31.05</td>
<td>39</td>
<td>1.12</td>
<td>.35</td>
</tr>
<tr>
<td>Verbal</td>
<td>9</td>
<td>52.33</td>
<td>8.42</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical</td>
<td>17</td>
<td>57.47</td>
<td>22.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual</td>
<td>12</td>
<td>47.41</td>
<td>21.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>37.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p > .05

Hypothesis 4: There is a relationship between Turkish students’ attitudes towards science and their successes in the science process in early childhood education.

In order to investigate the relationship between Turkish students’ success in the science process and their attitudes toward science in childhood education, one-way ANOVA was run. The findings of the one-way ANOVA are presented in Table 4.13. The results \([F (3, 40) = 7.95, p < 0.05]\) showed that Turkish students had a significant relationship between their success in science process and their attitudes towards science. According to the findings, if a child is one of the best in science process, he/she presents positive attitudes towards science in early childhood education.
Table 4.13

*Results of ANOVA Scores of Student’s Attitudes Toward Science According to their Success in Science Process (N = 44)*

<table>
<thead>
<tr>
<th>Valids</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Below average</td>
<td>14</td>
<td>43.50</td>
<td>16.53</td>
<td>40</td>
<td>7.95</td>
<td>.00</td>
</tr>
<tr>
<td>Average</td>
<td>17</td>
<td>50.35</td>
<td>9.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above average</td>
<td>9</td>
<td>64.22</td>
<td>24.62</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One of the best</td>
<td>4</td>
<td>87.75</td>
<td>28.50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Hypothesis 5: There is a relationship between Turkish students’ successes in other activities and their attitudes towards science in early childhood education.

To test the relationship between Turkish students’ success in other activities (language, art, math), a one-way ANOVA was run. The results of the one-way ANOVA are displayed in Table 4.14. The results [*F (4, 39) = 3.35, p<0.05*] revealed that Turkish students’ success in other activities (language, art, math) had significant effect on children’ attitudes towards science. According to the findings, if a child is successful in other activities (language, art, and math), he/she may show positive attitudes towards science in early childhood education.
Table 4.14

Results of ANOVA Scores of Student’s Attitudes Towards Science According to their Success in Other Activities (N = 44)

<table>
<thead>
<tr>
<th>Valids</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the worst</td>
<td>1</td>
<td>17.00</td>
<td>.</td>
<td>39</td>
<td>3.35</td>
<td>.01</td>
</tr>
<tr>
<td>Below average</td>
<td>18</td>
<td>47.50</td>
<td>18.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>13</td>
<td>57.92</td>
<td>18.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Above average</td>
<td>9</td>
<td>57.77</td>
<td>17.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One of the best</td>
<td>3</td>
<td>83.00</td>
<td>32.90</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Hypothesis 6: There is a relationship between Turkish students’ attitudes towards science and their teachers’ years of teaching experiences in early childhood education.

In order to investigate the relationship between Turkish students’ teacher’s years of teaching experience and their attitudes towards science, one-way ANOVA was run. The findings of the one-way ANOVA are displayed in Table 4.15. According to the ANOVA results \( F(2, 41) = 64.65, p<0.05 \) teachers’ years of teaching experience with Turkish students had a significant relationship with Turkish students’ attitudes towards science. As presented in the data, if teacher has long term experiences with Turkish students, his/her Turkish students show positive attitudes toward science.
Table 4.15

Results of ANOVA Scores of Student’s Attitudes toward Science According to Teachers’ Years of Teaching Experience with Turkish Students (N = 44)

<table>
<thead>
<tr>
<th>Valids</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 6</td>
<td>14</td>
<td>43.14</td>
<td>4.80</td>
<td>41</td>
<td>64.65</td>
<td>.00</td>
</tr>
<tr>
<td>3-4 years</td>
<td>23</td>
<td>48.56</td>
<td>13.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 4</td>
<td>7</td>
<td>96.14</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Hypothesis 7: There is a relationship between frequency of using science activities in a week and Turkish students’ attitudes towards science in early childhood education.

A one-way ANOVA was run for examining the relationship between frequency of using science activities in a week and Turkish students’ attitudes towards science in early childhood education. The results of the one way ANOVA are show in Table 4.16. ANOVA results [$F (3, 40) = 4.07, p<0.05$] showed that in early childhood education, frequency of using science activities had a significant relationship with Turkish students’ attitudes towards science.
Hypothesis 8: There is a relationship between times of using science in a day and Turkish students’ attitudes towards science in early childhood education.

In order to investigate the relationship between times of using science in a day and Turkish students’ attitudes toward science in early childhood education, one-way ANOVA was run. The results of the ANOVA are presented in Table 4.17. The results \( F(3, 40) = 3.31, p<0.05 \) revealed that in early childhood education, the time of day students engaged in science activities had a significant relationship with Turkish students’ attitudes toward science. The data show Turkish students had most interested with science during mid-morning.
Table 4.17

Results of ANOVA Scores of Student’s Attitudes toward Science According to Time of Using Science Activities in A Day (N = 44)

<table>
<thead>
<tr>
<th>Valids</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morning</td>
<td>14</td>
<td>43.14</td>
<td>4.80</td>
<td>40</td>
<td>3.31</td>
<td>.02</td>
</tr>
<tr>
<td>Mid-morning</td>
<td>9</td>
<td>68.33</td>
<td>24.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afternoon</td>
<td>8</td>
<td>60.75</td>
<td>1.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-afternoon</td>
<td>13</td>
<td>53.00</td>
<td>29.44</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*<p>.05

Hypothesis 9: There is a relationship between qualities of science corners in classroom and Turkish students’ attitudes towards science in early childhood education.

To investigate the relationship between qualities of science corners/areas and Turkish students’ attitudes toward science, one-way ANOVA was used. The results of the ANOVA are shown in Table 4.18. The findings \([F (3, 40) = 12.630, p<0.05]\) showed that quality of science corners/areas had a meaningful relationship on Turkish students’ attitudes towards science in early childhood education. According to the results, if the classroom had a good science corner/area, Turkish students showed positive attitudes toward science in early childhood.
Table 4.18

Results of ANOVA Scores of Student’s Attitudes toward Science According to Qualities of Science Corners/Areas (N = 44)

<table>
<thead>
<tr>
<th>Valids</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very poor</td>
<td>5</td>
<td>32.40</td>
<td>13.12</td>
<td>40</td>
<td>12.63</td>
<td>.00</td>
</tr>
<tr>
<td>Poor</td>
<td>5</td>
<td>44.20</td>
<td>1.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>22</td>
<td>49.54</td>
<td>9.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>12</td>
<td>76.75</td>
<td>25.91</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05

Hypothesis 10: There is a relationship between Turkish students’ attitudes towards science and their teachers’ teaching style(s) in science activities in early childhood education.

In order to investigate the relationship between Turkish students’ teachers’ teaching style and their attitudes toward science in early childhood, one-way ANOVA was used. The results of the ANOVA are presented in Table 4.19. The results of ANOVA \( F (3, 40) = 9.32, p<0.05 \) showed that teachers’ teaching style had a significantly relationship with Turkish students’ attitudes towards science in early education. According to the findings, while teaching science, using text books in classroom had a positive effect on Turkish students’ attitudes toward science in the early ages. The results also showed that hands on activities were as influential as text books.
4.3. Summary of Findings

This study was framed by the following ten research questions. Summary of the findings is shown in relation to each of the questions.

1) *What is the relationship between Turkish students’ genders and their attitudes towards science in early childhood education?*

In total, 44 surveys were completed by 6 teachers. Teachers reported data for 25 male and 19 female students. The results showed boys’ and girls’ attitudes towards science were not significant based on gender. Even though there were no significant differences between boys’ and girls’ attitudes towards science, boys showed more positive attitudes towards Physical Science and girls were most interested in Life Science.

2) *What is the relationship between Turkish students’ ages and their attitudes towards science in early childhood education?*
Completing 44 surveys showed that participants returned 19 surveys for 4-5 years old males, 6 surveys for 6-7 years old boys, 13 surveys for 4-5 years old females, and 6 surveys for 6-7 years old girls. The data results showed that there were no significantly relationships between Turkish students’ different ages and their attitudes toward science in early childhood education.

3) **What is the relationship between Turkish students’ learning style(s) and their attitudes toward science?**

Turkish students’ learning style(s) were reported as Logical, Verbal, Physical, Visual, and Others. Participants decided that Turkish students are mostly Physical learner (12 boys, 5 girls), 9 students (3 boys, 6 girls) as Verbal learner, 5 students (4 boys, 1 girl) as Logical learners, 12 students (5 boys, 7 girls) as Visual learners, and 1 student (1 boy) as others. According to the results, there was no significant relationship between Turkish students learning style(s) and their attitudes towards science.

4) **What is the relationship between Turkish students’ successes in the science process and their attitudes towards science in early childhood education?**

Science processes were described as observing, classifying, measuring, comparing, and communicating by Lind (1996). Participant reported; 14 students (10 boys, 4 girls) as below average, 17 students (9 boys, 8 girls) as average, 9 students (4 boys, 5 girls) as above average and 4 students (2 boys, 2 girls) one of the best in science process. This variable showed how Turkish students use their skills in the science process. As presented in the data, students’ success in science process had a positive relationship with their attitudes toward science in preschool and kindergarten education.

54
5) What is the relationship between Turkish students’ successes in other activities and their attitudes towards science in early childhood education?

Teachers use activities in early childhood education such as language, art, math, science, music, and gym for helping students to developments and begin K-12 readiness. With this research question, the researcher tried to examine what Turkish students’ success is in other activities. This question and question 4 showed how Turkish students use their language and other skills in education. Participants reported; 1 student (1 girl) as one of the worst, 18 students (14 boys, 4 girls) as below average, 13 students (7 boys, 6 girls) as average, 9 students (3 boys, 6 girls) as above average, and 3 students (1 boys, 2 girls) as one of the best in other activities. The results showed there was a significant relationship between students’ success in other activities and students’ attitudes towards science.

6) What is the relationship between Turkish students’ attitudes towards science and their teachers’ years of teaching experiences in early childhood education?

Teachers’ years of teaching experience with Turkish students were expected to be important for understanding Turkish culture and cultural differences. Participants reported; 14 students’ teacher(s) have less than 6 month teaching experience, 23 students’ teacher(s) have 3-4 years teaching experience, and 7 students’ teacher(s) had more than 4 years teaching experience with Turkish students. According to the results, there was a significant relationship between teaching experience and Turkish students attitudes toward science. If a teacher worked a long time with Turkish students, his/her Turkish students showed positive attitudes toward science in early childhood education.
7) What is the relationship between frequency of using science activities in a week and Turkish students’ attitudes towards science in early childhood education?

Even though science education is a growing concern in early childhood education, there are no studies about the ideal number of times science should be though in a week. In Conezio and French’s (2002) work, some teacher wanted to use more science activities in education programs. It is an important concern for students’ attitudes toward science. Based on this topic, participants reported their opinions in surveys; 8 students had science activities “less than 2 times”, 9 students “3-4 times”, 19 students “5-6 times”, and 8 students “more than 7 times” in a week. The results showed there was a significant relationship between frequency of using science activities and Turkish students’ attitudes towards science. According to the data, Turkish students who engaged in science activities “less than 2 times” and “more than 7 times” in a week had a positive attitude towards science. The results showed that Turkish students who engaged in science activities “5-6 times” in a week showed low interest in science.

8) What is the relationship between time of using science in a day and Turkish students’ attitudes towards science in early childhood education?

Participants reported what day time they mostly used science activities. Teachers reported; 14 students “morning”, 9 students “mid-morning”, 8 students “afternoon” and 13 students took science in “mid-afternoon”. The data presented there was a significant relationship between time of using science activities and Turkish students’ attitudes towards science. Data showed Turkish students who engaged in science activities “mid-morning” had more interest with science than students who engaged in science activities
“afternoon” and “mid-afternoon”. The results also showed Turkish students who engaged in science activities “afternoon” were more interested in science than students who engaged in science activities “mid-afternoon” and “morning”.

9) What is the relationship between qualities of science corners/centers in classroom and Turkish students’ attitudes towards science in early childhood education?

Completing 44 survey by teachers showed that 5 students were “very poor”, 5 students “poor”, 22 students “fair” and 12 students had “good” science corners/areas in their classrooms. The results showed there was a significant relationship between qualities of science corners/areas and Turkish students’ attitudes towards science. According to the findings, if students have “good” science environments, students showed positive attitudes towards science.

10) What is the relationship Turkish students’ attitudes towards science and their teachers’ teaching style(s) in science activities in early childhood education?

There are different kinds of teaching style(s) used by teacher when they teach science. Teachers reported 14 students “hands on activities”, 14 students “play based curriculum”, 11 students “text books” and 5 students mostly learn science with other teaching style(s). According to the findings, there was a significant relationship between teaching style and Turkish students’ attitudes towards science. The results showed that students who learned science from “text books” were the most interested in science compared to students who learn science from “hands on activities”. Data also showed
students who learned science from “hands on activities” were more interested in science than students who learned science from “play based curriculum”.


CHAPTER 5

CONCLUSIONS, DISCUSSIONS, LIMITATIONS, AND RECOMMENDATIONS

5.1. Conclusions

The aim of the current study was to investigate Turkish students’ attitudes towards science and science areas. The population of study was decided by selecting schools that had Turkish students in Preschool and Kindergarten classes. From two schools, six teachers reported data on 44 of their Turkish students.

The Child’s Attitudes Toward Science (CATS) survey was developed for investing children’s attitudes in science. CATS survey was created with three main sections relating to science; Earth and Space Science, Life Science, and Physical Science. From each sections, 19 questions were developed under their subtopics (see Appendix B). A Pilot study was completed with 24 senior undergraduate students. After the pilot study, some questions were changed and rewritten. The survey was also divided into two sections: teacher’s perceptions of students reword and child’s attitudes part.

The analyses were conducted using a T-test and one-way ANOVA. The T-test was run for investigating the relationship between gender and students’ attitude. The one-way ANOVA was run for investigating the relationships between teachers’ teaching
experience, students’ ages, students’ success in science process, students’ success in other activities, qualification of science corner/center, teaching style, learning style, times of using science in a day, frequencies of science activities in a week and students’ attitudes towards science in early childhood education.

5.2. Discussions

The results demonstrate that Turkish students have good attitudes towards science and science topics such as Earth and Space Science, Life Science, and Physical Science in preschool and kindergarten. Students are most interested in Life science than other science areas. Even though English language skills are one of the most important issues for diverse groups in the USA, when students learn science the results showed 68% of Turkish students use their English language skills in average and above average levels when they learn science. Additionally, if Turkish students’ English language skills are average and/or above average levels, students’ attentions are positive when they are in science activities.

**Males and Females’ Performances in Science**

Gender differences in science and math have been discussed in multiple studies along with the causes of these differences. According to the OECD (2010) results, the PISA collected data performances of students in reading, mathematics and science in 2009. The results showed that there were no significant differences between male and females’ scores in science. Howarth, Dale, and Plomin (2010) worked gender differences in school science performance for childhood to early adolescence. The researchers used teachers reported data for ages 9, 10, and 12 year old children (n>2500). According to the
researchers’ results, there were no significant gender differences in science performance. The current study worked with teachers of Turkish students in early childhood, ages (from 4 to 7 years old) and results were similar to results of Howarth, Dale, and Plomin’s (2010) work. However, in the Britner (2008) study about boys and girls self-efficacy in science (n=502, high school level), the researcher found girls had stronger self-efficacy in Earth Science than boys and also girls had higher grades than boys in Earth and Life Science. Boys and Girls didn’t show any differences on their grades and self-efficacy in Physical Science (Britner, 2008).

The results of the current study showed Turkish students’ genders and ages don’t have a significant relationship between their attitudes towards science. Although Adamson, Foster, Roark, and Reed (1998) studies shows differences based on student gender and their interest in science, this study didn’t support these results. Similarly, the current study’s results about gender and attitudes toward science were consistent with Patrick, Mantzicopoulos and Samarapungavan (2008) study: there were no significant differences in boys’ and girls’ interests in science during childhood. The researchers (Patrik, et al) stated there were interesting interactions between sex and type of learning experience for science.

Cultural Differences in Science

Culture has been studied in science education research based on students from low-income, racial, and different ethnic minorities. However there are limited studies in early childhood education. For this reason, this study is designed in early childhood education. According to the Bryan and Atwater (2002) studies about teacher beliefs in
multicultural issues and its impacts to teaching and learning science, students’ characteristic skills are important things when teaching and learning science. Agreeing to this idea, in this study, results showed that students learning style(s), genders, and ages didn’t affect students’ attitudes toward science.

For language skills, according to the data results, 68% of Turkish students use their language skills at average and above average in science process and other activities. Children’s language skills had a positive relationship with Turkish students’ attitudes towards science. On the other hand, language skills played a significant role when Turkish students engaged in science activities.

Effects of External Factors in Learning Science

There was no doubt about quality of science centers/areas and its positive relationship with child development. Bryan and Atwater (2002) also stated external influence on learning science. Children are affected by other factors when they learn science. This study showed that Turkish students’ attitudes towards science had a significant relationship with qualities of science corners/areas.

Consistent with Gillette (1998) about the importance of teachers being at least culturally sensitive in education, this study showed that if teachers worked on an extended period of time with Turkish students, their Turkish students showed positive performances when learning science. On the other hand, understanding Turkish culture by teachers helps students’ learning science in the early years. This study appears to be a first in the field with investigating the best time of day for teaching science and frequency of teaching science in a week. These topics were investigated for trying to find the best
time for teaching science to Turkish students in early childhood education. This idea comes from readiness to learn science. The current study showed that when teachers give science activities in the mid-morning time, Turkish students’ concentrations can be high for learning that science topics.

Tu’s (2006) study showed how teachers’ factors are important for teaching science in preschool years. The current study has similar perceptions with Tu’s works based on the teacher factors. The results showed teachers’ years of teaching experience and teaching style(s) had significant effects on Turkish students’ attitudes towards science in preschool and kindergarten. Tu’s study also stated the importance of creating science areas for individual and/or small groups of children to learn science. The current study reported qualities of science centers/areas for Turkish students’ attitudes regarding science.

Learning style(s) and teaching style(s) are two of the important items in education. Educators and other professionals pay attention to this when they teach and learn something. Felder and Henriques (1995) studies about learning and teaching styles showed that students learning style(s) and instructions’ teaching styles have unfortunate effects on the quality of the students’ learning and their attitudes regarding subject. The current study’s findings presented the importance of students’ learning style(s) and instructors’ teaching style(s) on Turkish students’ attitudes toward science. Even though, students’ learning style(s) did not show a relationship with their attitudes towards science in this study, the teachers’ teaching style(s) had a significant effect in learning science.
The current study reported that using textbooks by instructors had a significant effect when teaching science to Turkish students in early childhood education. Brenneman and Louro (2008) investigated the importance of using science journals in preschool as science tools for supporting and assessing child’s learning science and science literacy. Even though researchers (Brenneman & Louro, 2008) didn’t suggest science journals as a main curriculum, they stated science journals gave more chances for children to make observations and representation of children’s observations. These chances are good for students to improve themselves in science skills.

Foley and McPhee (2008) found students who engaged in hands on classes had a better chance of understanding the nature of science than students who engaged in textbook classes. Similar results were stated also in Varley, Murphy and Veale (2008) study. Varley, Murphy and Veale (2008) stated, 87% of pupils who were in the case study questionnaire and 78% of pupils who were in the survey showed extremely positive attitudes regarding hands on science. However, Pine and associates (2006) reported students who engaged in teaching science with hands on classes had no significant differences in their science knowledge and skills as compared to students who engaged in textbooks classes. Each of these three studies worked with 5th grades students. The current study reported Turkish students who engaged in using textbook for learning science showed positive attitudes regarding science as compared to Turkish students who engaged in using hands on activities for learning science in early childhood education.

5.3. Limitations of the Study

This study was limited by the number of participants who volunteered. Teachers were selected after a search for Turkish students in early childhood education (Pre-school
and Kindergarten classes). Participants and the researcher met and reviewed the voluntary participant’s letter.

The generalizability of the results of this study may be limited to Meskhetian Turk students. Dayton has a large Meskhetian Turk population within two schools, which were selected for this study due to extensive Turks students. For generalizability, similar studies may be tested in other states such as Pennsylvania and Georgia which also have a large Meskhetian Turk population.

The study was also limited by the time at the beginning of the year and some attitudes of Turkish students towards science activities were not observed or recorded because of curriculum during this time of year. This study was limited with regard to participants’ situations. The Researcher assumed the participants would respond honestly to the questionnaire.

5.4. Recommendations.

For Further studies:

This study focused on the Turkish students’ attitudes towards science in early childhood education. Findings showed Turkish students were interested in science especially in Life Science areas. For researchers who are interested in science education in early childhood, considerations should be given to other subgroups, such as African-American, Hispanic American, European-American, and Asian-American students’ interests in science in the USA. Working with each subgroup may help educators and professionals to understand cultural differences in learning and teaching science in early childhood education.
In this study, Meskhetian Turkish students were investigated in Dayton, Ohio. This study had limited generalizability regarding students’ attitudes towards science because of, lack of students (N=44). For future studies, researchers may want to investigate Meskhetian Turkish populations in other states or in other countries with more students. Researchers may also investigate other Turkish populations such as European Turks, Asian Turks, or Turkey’s Turks. Working with a large sample size should be helpful to understand Turkish culture in science and generalizability of Turkish students’ attitudes regarding science.

Multicultural countries have social responsibilities regarding subgroups. Professionals and educators need to know more information about subgroups and their cultural differences in education. The current study investigated Turkish students’ attitudes towards science in the USA. For future studies, researchers may want to research these groups’ interests in other educational activities, such as, language, art, music, and math. Working with other educational activities should be given more knowledge about Turkish culture and its effects to Turkish students’ abilities in early childhood education.

The current study also investigated relationships between Turkish students’ success in science process and their attitudes towards science based on teachers’ opinions. The results showed Turkish students’ attitudes towards science had an important relationship with their success in science process. Future researchers may want to investigate what are Turkish students’ performances in each science process, such as observing, measuring, classifying, comparing and communicating. Researchers may
investigate weakness and strengths of students observing, comparing, measuring, classifying, and communicating skills.

For this study, Turkish students’ attitudes in science based on teachers’ opinions were taken. These opinions were assessed over just one semester (Fall 2012). Future studies may want to follow students or parents for a whole year investigating with similar topics. For working with students, research may be studied with Turkish students face to face. For that, Researchers should pay attention to Turkish students’ language skills. CATS survey may be developed in English and Turkish to improve student’s understanding. For studying parents, future researchers should observe family life and/or interview parents after creating interview questions which help to investigate child’s attitudes regarding science in out of school.

For ELL Students’ Teachers

This study investigated some external effects on learning science such as qualification of science centers/areas, teaching experience, teaching styles, frequency of using science activities, and ideal time of teaching science. Teachers need to know the effect of Turkish students’ attitudes regarding science. This knowledge may give more opportunity for understanding students’ diversities and create different science teaching models for diverse groups in early childhood classroom. For example, qualification of science areas had significant relationship with Turkish students’ attitudes towards science. Teachers may want to create good science areas/centers in their classroom. For that, they can put magnifying glass, rock, seeds, pets, magnets, plastic animals, blocks, and science journals/books.
Teaching experience had a positive relationship with Turkish students’ attitudes towards science. Teachers may try to know more about Turkish students’ skills during their teachers’ experiences. This could be helpful for them and their Turkish students in science. For example, this study found Turkish students’ attitudes regarding science had positive relationship on teaching science from textbooks. Teachers may use textbooks when they teach science to their Turkish students. Teachers may bring science books, journals, and magazines in their science centers/areas. Teachers may create science shelves in the classroom library.

The Best Start Expert Panel on Early Learning (2007) papers stated “Curriculum is meaningful when there are clear matches between a child’s current knowledge and interests and the opportunities provided” (p.19). When teacher or other professional prepare curriculum, they should pay attention to diversity, cultural differences, students’ knowledge and interest to subjects. Teachers, who have Turkish students in their classrooms, may want to pay attention to this study results when they create their curriculum for their preschool and kindergarten classes. The results showed for teaching science in the “midmorning” and frequency of using science activities, less than 2 times and/or more than 7 times in a week”, has a positive effect for Turkish students.

For ELL Students’ Parents:

Education also must go on at home with teachers’ directions for parents. For ELL students, parents also must pay attention to using English at home. This should be helpful for supporting children’s language skills. They can give children opportunity while counting, baking, farming, and shopping times. For example, when parents make bread,
cookies, or cakes, they can make them with their children. Children can find a chance to observe, what the process of making these foods, what they need for making bread, cookies, or cakes. Child can note and learn basic science process such as observing, measuring, and classifying.

Additionally parents may talk more about earth and space. The current study’s results showed that, Turkish students had low interested in Earth and Space Science. For this, they can buy science journals about Earth and Space based on the level of their children. They may talk more about patterns of day and night, weather events (snow, rain, and wind), planets, and natural events (earthquake, erosion, volcanic eruption). They may make nature trips with their child. This should help improving children’s science skills such as observing, comparing, and classifying.
REFERENCES


Niron, D. G. (2011, March). In N. Cubukcu (Chair).*Türkiye’dede okul oncesi egitimin güçlendirilmesinde standartların belirlenip uygulanmasının önemi: Avrupa*
ülkeleri ile uyumlu okul öncesi eğitim model önerisi. Uluslararası okul Öncesi Eğitim Kongresi, İstanbul, Turkey

OECD (2010), PISA 2009 Results: What Students Know and Can Do – Student Performance in Reading, Mathematics and Science 1


STAConn.pdf


APPENDIX A

TEACHER’S PART OF SURVEY

Please read questions and write your answers that are best for you. Please choose one direction.

1. How many Turkish students do you have in your classroom? Male: Female:

2. How long have you been working with Turkish students?

3. How many times do you use science activities in a week?

4. What time do you use science activities in a day? Morning / Mid-Morning / Afternoon / Mid-Afternoon

5. What do you use most frequently in science activities?
   Hands on Activities / Play Based Curriculum / Text Books / Others (……………..)

6. What do you think about your science area? Very Poor / Poor / Fair / Good / Very Good

7. What do you have in your science area:
APPENDIX B

CHILDREN’S ATTITUDES TOWARDS SCIENCE SURVEY

Complete a survey for each of your Turkish students. Choose one answer for each question please.

Gender: Male/Female

Age: Less than 3 years / 4-5 years / 6-7 years / More than 8 years

Learning style(s)

Logical (mathematical) / Verbal (linguistic) / Physical (kinesthetic) / Visual / Other

(........................)

His/her success in the science process (observing, measuring, classifying)

One of the Worst / Below Average / Average / Above Average / One of the Best

His/her success in other activities (language, art, math,…etc.)

One of the Worst / Below Average / Average / Above Average / One of the Best

Rate each of your student’s attitude toward science.
<table>
<thead>
<tr>
<th>Rates Attitudes</th>
<th>Not Observed</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Most of the Time</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) He/she is interested in natural events (erosion, earthquake, volcanic eruption, and ...etc.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>2) He/she is interested in planets (the sun, the moon, earth, and...etc.)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>3) He/she is interested in weather events (rain, snow, wind, thunder, storm, and...etc.).</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>4) He/she is interested in different kinds of rocks and soils.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>5) He/she is interested in law of gravity.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>6) He/she is interested the patterns of day and night.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>L</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E</td>
</tr>
<tr>
<td>7) He/she is interested in the food chain.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>8) He/she is interested in animals (mammals, fish, birds, insects etc.).</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>9) He/she is interested in plants (trees, flowers, seeds, vegetables, fruits, etc.).</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>10) He/she is interested in living versus non-living things.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>11) He/she is interested how his/her body works (muscles, eye, lungs, respiratory, digestive... etc.).</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>12) He/she is interested in habitats.</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>13) He/she is interested exploring his/her senses (taste,</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Physical Science</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>14) He/she is interested in states of matter (such as, liquid, solid, and gas).</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>15) He/she is interested in properties of matter (sizes, colors, shapes, temperatures, weights... etc.).</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>16) He/she is interested in exploring lights and shadows.</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>17) He/she is interested in forces and motion.</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>18) He/she is interested in blocks, magnets and/or simple machines.</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>19) He/she is interested in kitchen chemistry (baking making ice-cream, cooking...etc.).</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>