

**PARENTAL INVOLVEMENT IN CHILDREN'S SCHOOL WORK  
AT HOME: A QUASI-EXPERIMENTAL STUDY REVIEWING  
PARENTS' INVOLVEMENT THROUGH AN ONLINE SCIENCE  
RESOURCE**

Thesis submitted for the degree of

Doctor of Philosophy

At the University of Leicester

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2016

## **Abstract**

The importance of parental involvement in their children's learning are highlighted by many studies in the literature and this study attempted to increase parental involvement in their child's science and general learning. This study includes several aims that were investigated in two stages. The first aim of this study, which investigated in Stage One was to identify the extent of parental involvement in their child's general and science learning, and the relationships between level of involvement and parents' backgrounds (parents, gender, child's gender, school group, science based career, family education). The second stage included the main purpose of this study. This purpose was to investigate the effects of parents' practising online science activities with their child intervention on parental involvement and parents' attitudes towards science as well as children's attitudes towards science.

Parents of either public and private schools' children from two different cities (Hatay and Gaziantep) of Southern Turkey participated in this study. Different groups of parents and their children took part in the two stages of this study. For Stage One, 202 parents participated in the parental involvement questionnaire from both private and public schools located in these two cities. 36 (18 parents for each experimental and control group) private school parents and their children participated in the Stage Two of this study. One private school from each city was selected to be the experimental and the control group. A quasi-experimental research design with experimental and control groups was used. Experimental and control groups were formed according to a matching technique which involve matching parents to the groups according to their involvement level, gender and education level.

Parental involvement questionnaire, parents' and children's attitudes towards science questionnaire, weekly feedback forms, parents' interviews were the main data collection tools for this study and these were used as pre and post-interventions. The intervention implemented with experimental group's parents and their children for five weeks. Parents were provided with science activities of an online website and instructions through email and handout by the science teacher. They expected to practise these activities weekly with their child at home.

The results from Stage One showed that parents' level of involvement, role construction beliefs, self-efficacy beliefs and attitudes towards science were positive, but their perceptions of invitation from teachers and their child were low. The results from Stage Two demonstrated that the intervention positively increased parental involvement in their child's general and science learning and the invitations from teachers and their child. A positively small difference for parents' self-efficacy beliefs was also found. However, parents' and children's attitudes towards science and parents' communication with teacher did not change after the intervention. In addition, a small decrease was found regarding parents' role construction beliefs.

## **Acknowledgements**

I would like to specially thank Prof Emma Smith for her valuable guidance, time and effort. Her analytical, constructive, in-depth and direct feedbacks and comments helped me to comprehend all my needs to complete this dissertation. Your help guided and enriched my learning gave me valuable lessons about how to do a research. I also thank Dr. Chris Comber and Dr. Maarten Tas for their valuable supports and help.

I want to thanks all the participants who participated in this study. Especially the parents who took part in the intervention process.

I acknowledge and thanks to the Turkish Ministry of Education for sponsoring all my economical needs in order to complete this study.

Finally, I specially thanks to my family who have always been the most influential factors in my life by giving endless encouragement, support and patience in order to achieve my ultimate goals.

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## **CHAPTER 1: INTRODUCTION**

This study investigated the effects of parents practising online science activities with their child intervention on parental involvement and parents' attitudes towards science. In addition, the extent of parental involvement in their child's general and science learning, and the relationship between level of involvement and their backgrounds were examined. A small-scale quasi-experimental research design was used to find these effects on parents and children's outcomes. This chapter covers the importance of this study, researcher interest to this study, the aims and research questions, context of Turkey education and outlines of this dissertation.

### **1.1 The significance of the study**

According to Weiss et al. (2005), parental involvement is the most important but one of the most disregarded supports for children's education both at school and at home. Over the last 40 years, the effectiveness of parental involvement on child's academic and social outcomes has been demonstrated (Weiss et al., 2009). Parental involvement has a positive effect on child's educational outcomes especially academic achievement (Henderson and Mapp, 2002; Desforges and Abouchaar, 2003; Hornby, 2011; Harris et al., 2009; Jeynes, 2005; Jeynes, 2007). Therefore, the communities, schools and governments want to improve parental involvement in order to facilitate their educational goals (Desforges and Abouchaar, 2003, Harris et al., 2009).

Parental involvement also improves the quality of schools by facilitating their educational goals (Desforges and Abouchaar, 2003). Schools that recognise the benefit of parental involvement and try to improve and use parents to help their child's learning by improving the cooperation between school and home have been more successful than schools which do not engage parents with their child's learning (Hornby, 2011).

According to Hornby (2011), parental involvement can have many benefits for parents, teachers and children. For parents, the evidence supports that parental confidence and satisfaction with their own parenting skills and interest in their own education can be improved by involving them in their child's learning. For teachers, parent-teacher relationships, teacher morale and school climate can be positively improved. For children, effective parental involvement can positively affect child's attitudes, behaviour, motivation and attainment at school as well as their mental health. These benefits are

valid across all ages of children from elementary to high school, for different genders and ethnic groups (Hornby, 2011, Hornby and Lafaele, 2011). Although the effect of parental involvement on educational outcomes is complex due to a number of intervening factors, the literature agrees that there is a strong relationship between parental involvement and child's achievement (Hornby, 2011).

Some research evidence has shown that parents are less likely to be involved in supporting their children's learning because they may face certain barriers (e.g. lack of confidence, lack of knowledge, and lack of communication). These barriers in general may decrease their involvement in their children's learning and in science learning because parents may have low levels of knowledge or have had negative experiences (Kaya and Lundeen, 2010).

This study is important because its aim is to reduce these barriers by helping parents to overcome these problems through the use of an intervention. According to Goodall and Vorhaus, (2011: 9) the empirical evidence for interventions regarding parental and children's academic outcomes have not been sufficiently robust. In addition, the evidence from intervention studies about parental involvement has remained weak. They stated that "There is little robust evidence on many academic and learning related outcomes and on many of the specific activities schools and services should undertake in pursuit of the general features of an effective parental engagement strategy."

Therefore, the researcher drew the conclusion from the literature that the weak evidence may base on the result of research which has either been poorly designed, has not used control groups, has had limited use of experimental or causal relationship research design, or has not used qualitative data collection methods. These problems can be eliminated by designing a study, which tries to deals with all of these possible weaknesses to provide reliable evidence. Since this study is designed to eliminate the majority of these weaknesses, the results from this study are important. The study included a quasi-experimental research design which used a control group and mixed data collection methods. In conclusion, this study may contribute towards the provision of reliable evidence about parental involvement interventions.

## **1.2 Researcher interest in this research topic**

As discussed in the previous section above, parents can contribute their children's educational life. Many parents value their child's learning, and want their child to complete higher education level and to be successful in their life. However, parents' contributions to their children's education limited for most parents and many of them seek a help to contribute to their children learning. This study will help to understand what parents doing to help their child's learning and it will provide them to practise parental involvement with their child. Therefore, this study can contribute parents, children, teachers, schools and policy making about parental involvement.

I undertook an undergraduate degree in science teacher department in Turkey and I followed my career in science education by doing a master degree in this field. During my education, I experienced teaching as a candidate science teacher in some secondary schools. I also worked as a researcher at a university by doing a research with candidate science teachers during my master education. These experiences and some of my own personal experiences increased my interest in parental involvement, science education and using technology in learning.

Through my own life experiences, I have encountered many situations regarding parental involvement both at home and in school. Although I have never worked as a teacher within any school, I saw the problems associated with parental involvement when I was a researcher and a candidate teacher in schools, and I heard complaints regarding some of the problems from the teachers and school staff. The main problem was related to the fact that many parents did not show an adequate level of interest in their children's learning. Many of them did not directly support their children's learning with the exception of providing money or sending their children to better schools. For example, when they were invited to parent-teacher meetings at the school regarding their children, many parents did not want to come or did not come at all. I experienced this problem on many occasions at schools.

Through my own educational life, my parents have always supported my education and they have always wanted me to complete a better level of education. For this purpose, they tried to help me in whatever capacity they were able to provide, but their direct help in school work was only limited to primary school. When I became older and completed

higher levels of education, their direct involvement decreased with the exception of providing financial support.

I have also observed the same problem with many Turkish families. These complaints from schools and my observations have inspired me to conduct this study to increase parental involvement in their own children's learning. I had several modules regarding using technology in children's learning both during my undergraduate and master education. Interests of children towards using technology in their learning and the importance of technology in children's education inspired me to use an online website in order to involve parents in their learning at home. Since I have a science education background, all these interests and inspirations combined to do this research. In the literature review chapter, the importance of parental involvement and some barriers (e.g. lack of confidence or knowledge and lack of time) related to my observations have been described and some effective ways for overcoming them have also been mentioned.

### **1.3 The aims and research questions**

The first aim of this study was to identify the extent of parental involvement in their child's general and science learning, and the relationship between level of involvement and their backgrounds (parents, gender, child's gender, school group, science based career, family education). The second and main purpose of the study was to investigate whether the intervention (the parents practising online science activities with their child intervention) had any effect on parental involvement and parents' attitudes towards science. Therefore, this study has two stages, of which, the first stage is to meet the primary aim (the first and second research questions) and the second stage is to explain the secondary aim (The third and the fourth research questions).

The scope of this study is to investigate Turkish parents' involvement in both their child's science and general learning, and the effect of the intervention on parents' involvement. In addition, parents' and their children's attitudes towards science were investigated and the effect of the intervention on these variables were researched. However, although the importance of parental involvement in their children's achievement is mentioned in the literature review, this research did not have any main focus to investigate the effect on children's achievement directly. The research questions and aims did not include children's achievement in science or in general learning. However, one of the main focus is to investigate the effect on children's attitudes towards science.

The research questions posed in this study were:

- 1) What is the extent of parental involvement in their child's general and science learning, and what are parents' attitudes towards science? To what extent do parental involvement and its components vary according to background
- 2) What are parents' attitudes towards science? To what extent does parents' attitudes towards science vary according to background?
- 3) What are the effects of the intervention (*parents practising online science activities with their child*) on parental involvement, and its components, in terms of their child's general and science learning?
  - a) Does the intervention change parental roles and parents' beliefs about their involvement in their child's general and science learning?
  - b) Does parents' self-efficacy about helping their child's learning in general and in science change after the intervention?
  - c) To what extent do parents' perceptions of invitations from the teachers and their child to support their child's learning in general and in science change after the intervention?
  - d) What is the effect of the intervention on parent-teacher communications?
  - e) To what extent do parents' attitudes towards science learning change after the intervention?
- 4) What is the effect of the intervention on children's attitudes towards science and their interest towards homework or studying at home?
  - a) What are the effects of the intervention on children's attitudes towards science and their interest in homework or studying at home?

#### **1.4 Overview of the Context of Turkey Education**

The study conducted in Turkey and it is important to overview Turkish Education System. According to Basic Law of National Education, which was introduced and approved in 1973, the Turkish Ministry of Education (MEB) regulates and administers all educational services in Turkey. This includes all the formal and non-formal education institutes except higher education which is self-regulated, but it is supervised and controlled by Higher Education Council (YOK). The main responsibilities of the MEB are to develop the national curriculum and educational materials that include textbooks,

to coordinate the work of educational institutions (formal and non-formal), to provide and build school buildings and other educational services (Balim and Kucuk, 2010).

According to Unesco (2012: p.2), the aim of the Turkish Education System is “to raise highly skilful, productive and creative individuals of the Information Age who are committed to Atatürk’s principles and revolution, have advanced thinking, perception and problem-solving skills, are committed to democratic values and open to new ideas, have feelings of personal responsibility, have assimilated the national culture, can interpret different cultures and contribute to modern civilization, and lean towards productive science and technology.” The Turkish National Education system is based on two main systems which are formal and non-formal education. While the formal education involves pre-school, primary, lower secondary, upper secondary and higher education institutes, all other organisations that includes educational activities are the non-formal education.

Pre-school education is the first step of the formal education. It is optional for children who are 3-5 years old. The purpose of this education is to prepare children to primary education, to assist them physically, mentally and emotionally for developing good behaviours, and to make sure that these children speak good Turkish (Eurydice, 2016). The second step of the formal education is the Primary education. This education is compulsory for all children who are 6-9 years old and it takes four years. The aim of this education is to provide children with “necessary basic knowledge, skills, attitudes and habits to become a good citizen, to grow in line with the national morality, interests, in terms of capability and the ability to life and ensure the preparation of a higher education” (Eurydice, 2015: p.1).

Lower secondary education has the similar purpose of the primary school, and it is also compulsory and it takes four years to complete. Upper-secondary education is the last part of the compulsory education, which also takes four years. The first purpose of secondary education is that “to give a common general knowledge to all students at a secondary level to recognize the problems of their people and society, to seek solutions and international economic, social and awareness to contribute to cultural development” (p.1). The secondary purpose is “to prepare students who are interested in the various programs and schools, and in line with the talents and capabilities by means of higher education for life and business” (Eurydice, 2015: p.1). Last part of the formal education

in Turkey is the higher education. This education takes at least two years and maximum six years to complete. It covers all the education provided by the universities and institutes, which includes undergraduate, master, doctorate degrees (Eurydice, 2015).

According to Örs et. al. (2013) the quality and equity of the education in Turkey was not adequate; therefore, the education system was changed in 2012 to both increase the quality and the equity. Duration of the compulsory education is increased from eight years to thirteen years. These thirteen years include one year for pre-school, four years for primary, four years for lower secondary and four years for upper secondary education (Örs et. al., 2013). According to Gok (2007), gender differences were the most recognizable inequality in the Turkish education system. The participation rate of women in education was lower than men. Women rate of leaving school after the compulsory education was higher (Gok, 2007). Therefore, 4+4+4 compulsory education system is offered in 2012.

Turkey has high population of children who is age lower than 20. (Turkstat, 2013). According to Gok, (2007), this leads to overcrowded school and classroom. Higher population of the public school also decreased the quality of the education. Therefore, the demand of private schools increased lately. Parents who are from high socio-economic background prefer these schools for their children in order to provide better education to them. Turkey has private school that offers education for all levels of formal education. Although these school can provide better education with lower class size, annual tuition fees range between \$3,000 and \$13,000 (Gok, 2007).

Entry to upper secondary schools is selective and based on exam scores. This leads to very competitive entrance examinations for reputable upper secondary schools and universities. At the Year 8, all the lower secondary schools' children must take their first national exam to receive enough score in order to be accepted by reputable upper secondary schools. In order to achieve this, parents from middle and high socio-economic background spend lot of money for their children to get higher scores from this exam. This also increased the demand of private preparatory schools that provide private tutoring for children for all subject in order to be better prepared to the national exams (Gok, 2007). The number of the preparatory schools have increased rapidly in the last ten years, but two years ago, the government introduced a new law to turn these school to private schools; however, this law rejected by the high court of Turkey.

Another important reason of the increased number of these preparatory schools is the quality of the education in public schools. The public schools could not provide the necessary education in order to get higher scores from the national exams (Cinoglu, 2006). Most of the children from all background participate to a preparatory school, but the children from higher socioeconomic background go to a better preparatory school at lower grades levels and lower ages (TED 2006). This leads inequality in the education, which children from higher economic background receive more education and have more chance to be accepted from better upper secondary schools, which in turn will go to a better university. These issues tried to be solved lately by the government, but without increasing the quality of the school and teachers, this issue will remain.

### **1.5 Outline of this dissertation**

This dissertation includes ten chapters. Chapter One explains the importance of this study, researcher interest to this study, the aims and research questions, overview of the context of Turkey education and outline of this dissertation respectively.

Chapter Two is the first chapter of literature review. It firstly starts with the definition of ‘parental involvement’ from the related literature. Secondly, the benefits of general parental involvement in their children’s general and science learning are explained. Thirdly, the barriers to parents’ direct involvement in their children learning are discussed. Fourthly, some of the possible ways to promote parental involvement are covered. Fifthly, the adopted parental involvement model is described. Finally, this chapter ends by discussing the effectiveness of the parental involvement interventions from meta-analysis studies and the different types of parental involvement interventions.

Chapter Three covers some aspects of the intervention used in this study and it is the second part of the literature review. This chapter explains the use of technology for parental involvement, attitudes towards science and parental involvement in homework respectively from the literature and it ends by explaining TIPS interactive homework that adopted for this study.

Chapter Four is the methodology chapter. This chapter describes the methodology and research design of this study in six sections. The first section presents the aim and research questions. The second section briefly discusses the theoretical underpinnings of the study. The third section explains the experimental research method and quasi-



experimental research method adopted, explaining why this design has been chosen and the advantages and disadvantages of it. The fourth section introduces the intervention that used in this study. The fifth section covers possible issues regarding the internal and external validity of the study and how best to control these issues. The sixth and final section details possible ethical issues and the ways to minimise concerns.

Chapter Five covers the data collection process. It contains five sections describing the process by which data was collected for the research project. Section 5.1 describes the development of the data collection instruments, while Section 5.2 covers the piloting of the questionnaires and the intervention. Section 5.3 deals with the selection of the study sample and explains the matching process for allocating parents to the experimental and control groups. Section 5.4 explains the implementation of the study and the steps that took place before and during the intervention process. The final section covers how the data analysed.

In Chapter Six, the general questionnaire data results for phase one of the study are presented to provide general information regarding their views on the extent of parental involvement in children's learning, and their attitudes towards science specifically. It provides the phase one results which provide insight about the parents of children who attended either a private or a public school.

In Chapter Seven, the interview data for the parents of children who attended the two private schools and agreed to participate in the intervention are explained. This chapter provides more detailed information about the experimental and control parents prior to the intervention in order to investigate the effects of the intervention by comparing the pre and post-results as a baseline to gauge behaviour that may or may not have changed as a result of the intervention.

Chapter Eight explains the results from the intervention, which is the phase two of the study. The effects of the intervention on parents and children are explained and interpreted by presenting the pre and post-interviews, the children's feedback and some of the teacher interview data, alongside the effect size difference data.

In Chapter Nine, the results for the experimental parents, their children and the teachers, in terms of the implementation and the experiences of the intervention, are explained. first, parents' evaluations of the intervention are explained, drawing on the weekly

feedback forms, post-intervention interviews and post-intervention questionnaire data. Second, the children's evaluations of the intervention are presented, drawing on the open-ended questionnaire data. Third, the science teacher's evaluation of the intervention, along with the data collected in the interview with the science teacher, are discussed. Fourth, the parents' experiences of communicating with the teachers are discussed, referencing both parents' and teachers' responses to the interview questions. Finally, the experiences and observations of the researcher are evaluated.

Chapter Ten underscores the results regarding stage one and two of the study in order to answer the research questions. Firstly, the summary of the important findings regarding stage one and the first research question are discussed. Secondly, stage two results and research questions two, three and their sub-questions are explained and interpreted. Thirdly, the results about the evaluations of the intervention by parents, children, teacher and researcher are explained and discussed. Fourthly, the limitations of this study are explained. Finally, this chapter ends by presenting implications and recommendations of this research.

## **CHAPTER 2: PARENTAL INVOLVEMENT IN THEIR CHILD'S LEARNING**

The literature review of this study divided to two chapter. The first chapter covers the benefits and the barriers of parental involvement, some effective ways to enhance parental involvement and parental involvement model. The second chapter focuses on subject based parental involvement, which include parental involvement in technology, parental attitudes towards science and parental involvement in homework.

This chapter is the first chapter of literature review. It firstly starts with the scope of the literature review and then explains the definition of 'parental involvement' from the related literature. Secondly, the benefits of general parental involvement in their children's general and science learning are explained. Thirdly, the barriers to parents' direct involvement in their children learning are discussed. Fourthly, some of the possible ways to promote parental involvement are covered. Fifthly, the adopted parental involvement model is described. Finally, this chapter ends by discussing the effectiveness of the parental involvement interventions from meta-analysis studies.

### **2.1 Scope of the Literature Review**

The literature was searched according three main themes that help to plan and organize the literature review of this study. The first theme sought the studies regarding to parental involvement in their children's learning. For this theme, the studies that reported the benefits of parental involvement, a definition of parental involvement, the barriers of parental involvement, effective ways to increase parental involvement, working parental involvement model and effective parental involvement interventions were identified and the literature review was constructed according the evidence that acquired from these studies. In addition, the studies that related to parental involvement in science learning were sought and reported with the studies that provide evidence about parental involvement in their children's learning. The second theme sought the study combining parental involvement and the use of technology. The purpose of this theme was to underline the importance of technology both for children's learning and the role in increasing parental involvement. The last theme was regarding the attitudes towards science for both parents and their children which thought to be important in order to increase children's achievement and interest in science learning.

The main educational and psychological electronic databases were searched according to key words that relates the three main themes and their subcategories. ERIC, ProQuest, British Educational Index, Science Direct, BECTA, SSCI journals, British Library ETHOS dissertations and JSTOR databases were the main databases that used to find the important studies. In addition, Google Scholar and the references list of some key studies were used to identified some relevant research.

The studies that have the following criteria was included in this study:

- Published between 1990 and 2015 were included.
- Reported in English and Turkish.
- Providing evidence for the benefit of parental involvement, providing a definition, explaining the barriers or reporting effective ways to improve parental involvement.
- Using parental involvement intervention especially with experimental research methods.
- Meta-analysis regarding parental involvement.
- Using technology with parental involvement.
- Parents and their children's attitudes towards science.
- Working model of parental involvement.
- Effective interventions.
- Benefit of technology in science learning.
- Actively involving parents in their children's learning.

The main search words or terms were as the following: “parental involvement”, “parental involvement and science learning”, “benefits of parental involvement”, “barriers for parental involvement”, “increase parental involvement”, “Parental involvement model”, “parental involvement intervention”, “ICT and parental involvement”, “Using technology for parental Involvement”, Parents’ attitudes towards science”, “children’s attitudes towards science”. In addition, “parental engagement” term was sometimes used rather than parental involvement.

Desforges and Abouchaar (2003), Henderson and Mapp (2002), Nye et. al. (2006), Jeynes (2005, 2007, 2012), Kaya and Lundeen (2012), Hoover-Dempsey et. al. (2005), See and Gorard (2013), Goodall and Vorhaus (2011), Hollingworth et. al. (2009), Osborne et. al.

(2003) and Perera (2014) were some of the important studies in the literature regarding this study.

## **2.2 Definitions of Parental Involvement**

There are a number of different definitions of parental involvement in the literature. One of the most cited definitions of parental involvement is the Epstein framework definition. Six types of involvement are defined: “parenting, communicating, volunteering, learning at home, decision making and collaborating with the community” (Sheldon and Epstein, 2005; p.197). More specifically:

- Parenting: Supporting parents to create an environment in their home that enables their child’s learning.
- Communicating: To ensure that there is good communication between home and school.
- Volunteering: Attending parents to help their children at school, at home or in other places.
- Learning at Home: To provide parents with the necessary knowledge or guidance to help their child’s education at home.
- Decision making: Serving parents in school committees as a member.
- Collaborating with community: To help parents improve school programs by reaching the facilities from the community (Epstein and Salinas, 2004).

Henderson and Mapp (2002) define parental involvement as different kinds of behaviours and activities such as attitudes, beliefs, aspirations and expectations toward their child’s learning, which parents represent in the home or in the school. Hornby describes parental engagement which he used rather than parental involvement as being involved in activities that are directly (such as homework) or indirectly related (such as attending meetings) to learning (Hornby, 2011).

LaRocque et al. (2011) describes parental involvement as parents’ responsibilities in their child’s education by making investments in different ways such as volunteering, participating and visiting school, and supporting their child’s learning at home by helping with homework or activities. The United States Department of Education (2004) gives a similar definition of parental involvement as “the participation of parents in regular, two-

way and meaningful communication involving student academic learning and other school activities, including ensuring:

- that parents play an integral role in assisting their child's learning;
- that parents are encouraged to be actively involved in their child's education at school;
- that parents are full partners in their child's education and are included, as appropriate, in decision-making and on advisory committees to assist in the education of their child and;
- that other activities are carried out" (United States Dept. of Education, 2004; p.31-32).

The definition of parental involvement in Jeynes's (2007) study is as participation of parents in their child's learning process and learning experiences. Nye et al. (2006) defined parent involvement in their study as effective engagement of parents in activities that are designed to promote the academic success of their children out of the school.

In conclusion from these definitions, parental involvement should be directly connected to their child's academic learning and should include support with activities at home. In addition, parents should communicate effectively with their child's teacher to get more information and support for their child's home learning. Since the aim of this study is to provide parents with necessary help for involvement in their child's learning, based on the literature, the definition of parental involvement in this study is the participations of parents in their child's learning process and learning activities through effectively communicating with their child's teacher. This allows them to get more support about how to help their children learning in their home and involve them with their child's learning at home by using this support.

### **2.3 The Benefits of Parental Involvement**

In this section, the general benefits of parental involvement on child's academic achievement, attitudes, motivation, and beliefs are explained from the related studies. Firstly, the benefits of parental involvement for their child's general and science learning are explained alongside of each other. Since the focus of this section is the effectiveness of parental involvement in their children's learning, the reliability of the evidence provided for parental involvement studies is discussed in the last section of this chapter.

### **2.3.1 General benefits and children's academic achievement**

Parental involvement can have benefits for children (academic achievement, attainment, behaviour, motivation and educational outcomes such as attitude towards and belief about learning) and parents (interest, confidence, participating in their children learning and even their own learning) as well as for teachers (Hornby, 2011). Desforges and Abouchaar's (2003) review on parental involvement is one of the important reviews in this domain and they concluded that parental involvement has many different forms. The most effective form of parental involvement on children's educational outcomes, however, is "at-home good parenting" in which many activities and homework are used by parents to help their children's education at home (p.4). "At home good parenting" is more effective on children's educational outcomes than all other forms of involvement (e.g. participations in school events), even all of them taken together. In addition, in this review, it is concluded that parental involvement regarding at home good parenting has a significant effect on student achievement and attainment (Desforges and Abouchaar, 2003).

Another important review about parental involvement is by Henderson and Mapp (2002). In this review, studies designed to find causal relationships (e.g. experimental design research) and qualitative studies (e.g. case studies) are reviewed. These studies can provide reliable evidence about the benefit of parental involvement. They conclude from these studies that parental involvement has many benefits for children. These important benefits are higher grades and tests marks, attending more difficult academic programs, earning more credits, completing more classes, developing good behaviour both at school and at home, improved attendance, improved social competences and better adaptation to the education system. They also stated that increased parental involvement influences a student's cognitive and social outcomes positively (Henderson and Mapp, 2002). In addition to these benefits of PI, in another study, it is mentioned that better homework completion, motivation to the education system and attitude toward school and school subjects can be improved thanks to increased parental involvement (Darch et al., 2004).

In their longitudinal study about parental involvement, Sui-Chu and Willms (1996) looked at how the activities, different ethnicity and social class affect child's achievement through questionnaire data collection. They concluded that home discussion about school work between parent and child makes an important contribution to child's success at

school without looking at the parent's background. In another longitudinal study using a large number of participants and different methods that include over time assessment of children, parental interviews, school staff interviews, rating scales and case study observations, it was concluded that parental interest and help at home toward their child's school work is associated with better social and cognitive outcomes for children (Sylva et al., 2004). Singh et al. (1995) found that parental involvement did not influence child's success in the form of activities which are only done at school, but they found that the at home parent-child discussions form of parental involvement showed a moderate influence on child's educational success and that parental aspiration influenced achievement directly and indirectly.

Nye et al. (2006) reviewed 18 studies that used randomized control trials design to find the effects of parental involvement interventions on academic achievement. They found that there is robust evidence for the effectiveness of parental involvement on student's general academic outcomes and they also stated that these effects are fair enough for implications. According to this evidence, if families participate in parent programmes that aim to improve parents' academic skills to help their children learning at home, students will benefit greatly from their parents' involvement by improving their academic outcomes (Nye et al., 2006).

Although there are limited studies about the effect of parental involvement in science education, existing research showed that parental involvement can have a positive effect on child's science achievement (Oluwatelure, 2008, Olatoye and Agbatogun, 2009, Shumow et al., 2011). The important relationship between parental involvement and student's academic success in science is highlighted in some studies (Olatoye and Agbatogun, 2009, Oluwatelure and Oloruntegbe, 2010, Olatoye and Ogunkola, 2011). Although these studies mention the benefits of parental involvement in science education, they do not provide adequate reliable evidence because these studies might not use an experimental research design which it is the only research design can establish a causal relationship.

### **2.3.2 Attitudes towards children's education**

The other important effect of parental involvement on their children's learning is the effect on children's attitude towards learning. In some reviews, it is highlighted that parental involvement has a positive effect on children's attitudes towards school and



learning (Henderson and Mapp, 2002; Desforges and Abouchaar, 2003; Harris and Goodall, 2006). Parental attitudes and behaviours toward education by showing interest in the activities of their children, arranging their home environment and showing their good beliefs and aspirations to their children have a positive influence on children's academic success. (Feinstein et al., 2006). In addition, parents' beliefs and values toward education can be conveyed to their children (Feinstein et al., 2006). Students' perceptions might be positively influenced by parental involvement, expectations, attitudes and supports. Child's educational success is affected in a good way by parent positive attitudes and involvement in their education (Alrehaly, 2011).

In relation to science education, there are some beneficial effects of parental involvement on children's attitudes towards science (George and Kaplan, 1998; Kaya and Lundeen, 2010; Chen, 2001; Boon, 2012). George and Kaplan (1998) concluded that families play a significant role in their children's attitudes towards science. When parents show interest and discuss science subjects and their experiences at school with their children, this leads to them having better attitudes toward science and leads to more interest in science-related careers (Kaya and Lundeen, 2010). Chen (2001) concluded that there is a clear connection between parents' attitudes and their children's attitudes toward science. Fleer and Rillero (1999) showed that science achievement and attitude can be directly and positively affected by parental involvement.

### **2.3.3 The Importance of Parental Involvement for older children**

While the positive effect of parental involvement is important for elementary stage children (Jeynes, 2005), it is also important for older children and teens by improving their academic outcomes, achievement scores and gained marks (Bouffard and Stephen, 2007, Catsambis, 2001, Jeynes, 2005, Jeynes, 2007). According to Gonzalez-Dehass et al. (2005), if parents have high expectations of their older children, these child's interest toward their education, self-regulation of their success, motivation and pursuit of their parents' expectations will improve (Marchant et al., 2001, Gonzalez-DeHass et al., 2005). If the educational issues are discussed more with parents, adolescent expectations will improve and thus lead to increased academic achievement (Jeynes, 2005). Jeynes (2007) described that parental involvement is more effective on achievement in elementary school than secondary school because primary school children are more affected by their parents' values.

### **2.3.4 Child's Motivation**

Another benefit of parental involvement is the effect on child's motivation to succeed in general learning at school (Chunis, 2011, Kaya and Lundeen, 2010, Hoover-Dempsey et al., 2005). Chunis et al. (2011) stated that hands-on learning and parents are factors that positively change motivation of students toward science. Their evidence is based on in-depth analysis by interviewing and surveying parents and observing children. Marchant et al. (2001) found that when children see more interest from their parent about their academic achievement and academic efforts, their motivation and perception of competence will increase. According to Gonzalez-Dehass et al. (2005), child's effort, concentration and attention can increase when their families engage more with their learning. Although child's extrinsic motivation is directly related to their parents' pressurising them to complete homework and using extrinsic rewards for academic success, good encouragement and praise for better achievement improve child's intrinsic motivation. Child's self-perceptions of competence and success influence their motivation. When children see more interest from their parents and accept them as good models and partners in their education, children evaluate their abilities and performance about their learning. If parents believe their children are more motivated due to their involvement, they will want to engage more with their child's learning (Gonzalez-DeHass et al., 2005).

### **2.3.5 Child's beliefs regarding their learning**

Another important aspect of parental involvement is the belief towards learning. According to Feinstein et al. (2006), values and beliefs of parents about learning can be conveyed to their children. The development of children of all ages can be positively affected by parent-child interactions (Feinstein et al., 2006). When parents believe that their children benefit from their involvement, they tend to involve themselves more in their child's learning and activities (Russell and Granville, 2005). Child's beliefs in their capabilities are greatly influenced by their school environment, parental involvement and parental aspirations (Senler and Sungur, 2009). In relation to science, Bhanot and Jovanovic (2009) stated that overall beliefs of parents about the importance of subjects and activities can be conveyed to their children. In other words, behaviour of parents towards any subject can influence their child's own beliefs about that subject. Therefore, if parents believe that science is important and can be learned, these beliefs can be conveyed to their children and the child's belief about science may change. In addition,

child's beliefs can affect parents' behaviour (Bhanot and Jovanovic, 2009). Tenenbaum and Leaper (2003) stated that student interest in science and self-efficacy in science can be positively predicted from their parents' beliefs about science.

Overall, based on some quantitative (Desforges and Abouchaar, 2003), casual relationships and qualitative studies (Henderson and Mapp, 2002), parental involvement has important effects on children's educational outcomes. Although limited studies have been conducted to find out the relationship between parental involvement and child's science-related outcomes, these limited studies provided a benefit of parental involvement in their children's science learning. However, according to some meta-analysis' studies such as See and Gorard (2013) and Goodall et. al. (2011), the evidence base of the effectiveness of parental involvement from the intervention studies is not clear due to methodical issues and some unclear evidence. This is explained in the last section of this chapter.

## **2.4 The Barriers to Parental Involvement**

Many barriers that prevent parents from becoming involved in their children's learning are explained in the literature. In this section, the general barriers for parental involvement that directly relate to parents support in their children's learning are explained. Parents' lack of confidence, beliefs, skills, knowledge and communication are the main barriers emerged in the literature.

Parental involvement is complex and multidimensional, and many factors can influence it, such as time, social, personal and behavioural factors (Fishel and Ramirez, 2005, Hollingworth et al., 2009). Despite the effect of these factors which contribute to the barriers of parental involvement, many parents want to be more involved in their child's learning and many parents are also faced with many difficulties due to not knowing how to involve themselves in their child's education (Fishel and Ramirez, 2005, Muir, 2012, Peters et al., 2008).

Parents face many barriers for their involvement in their child's learning. The most important barriers for them are low level of income, limited time, transportation, low level of education, using a different language from the school and lack of confidence (Goodall and Vorhaus, 2011). These barriers influence their involvement in their child's learning both at home and at school. According to Green et al. (2007), parents' level of

education may directly affect their involvement because these parents think that they do not have enough skills and knowledge to help their children. Many parents do not know how to help their children due to not having sufficient confidence and knowledge (Goodall and Vorhaus, 2011). According to Pharoah and Rowe (2008), poorer families can face numerous barriers to help their child's learning and this has a negative effect on their involvement.

Hornby and Lafaele (2011) stated that beliefs of parents regarding their child's learning can be an important barrier for PI. They described these beliefs in relation to the beliefs about their role as parents, about their own academic abilities and about their child's abilities. If parents' beliefs about their role in their child's education are only to make certain that their children go to school by taking responsibility for it, and not participating directly with what they learn or how they learn, this may affect their engagement in their child's learning. The other crucial beliefs of parents are beliefs about their abilities in helping their child's learning. Many factors can affect these beliefs such as previous negative experiences with their child's learning or their own learning, language, their confidence and level of education (Hornby, 2011, Hornby and Lafaele, 2011).

Parents' lack of confidence in helping their child's learning is highlighted by many studies (Hollingworth et al., 2009, Lewin and Luckin, 2010, McNamara et al., 2000, Opinion Leader, 2009, Lall et al., 2004, Peters et al., 2008). For example, Peters et al. (2008) have argued that parents' lack of confidence in their children's learning is mainly caused by the use of different teaching methods from their own days and the lack of understanding of their children's current school subjects. Parents' lack of confidence is higher when their children go to secondary or high school because the academic subjects become more difficult than primary school and parents' feelings about their competence for supporting their children decrease (Hornby, 2011).

In addition to parents' confidence, parents' beliefs about their skills and knowledge are also important barriers (McNamara et al., 2000). Harris and Goodall (2007) stated that parents' skills were one of the most important barriers for their engagement in their child's education. Knowledge, skills and confidence are important barriers for parents to involve themselves in science. Stepanek (1998) stated that when parents say "I have never been good at math" or at science, they might not recognize that their child's attitudes toward maths or science can be influenced by these confessions about their skills. Many

parents may not have the necessary knowledge to help their children in science learning (Kaya and Lundeen, 2010). Parents' inadequate knowledge and limited understanding of science may cause them to feel helpless in their child's science learning. Parents' science knowledge and awareness of the importance of science are also sometimes limited (Bond and Harbinson, 2010).

The other important parents' beliefs for involving in their child's learning are their beliefs about their child's abilities. If parents who believe that their child's abilities are stable and their achievement will not change by their involvement due to believing that the abilities of their children have a limit, these parents might see parental involvement as unnecessary. If parents who believe that their child's abilities can be positively changed by their involvement, they tend to be more supportive and involved (Hornby, 2011, Hornby and Lafaele, 2011).

The other important barrier for parental involvement is communication between home and school. Stepanek (1998) stated that home-school communication tends to be one-way from school to home and some schools may only communicate with parents when a problem occurs about their children. Therefore, parents may not have enough information about their child's school life and the school may not receive information about child's home life (Stepanek, 1998). Kaya and Lundeen (2010) discussed parents' lack of knowledge about what their children learn about science in school. This may be caused by their negative memories about their own science learning, lack of science knowledge or inadequate home-school communication, resulting in parents to engage less in their children's science learning (Kaya and Lundeen, 2010). Peters et al. (2008) mentioned that parents who are less engaged in their child's learning tend to communicate less with the school.

Overall, parents' low level of income, limited time, low level of education, using a different language from school, lack of confidence, skills, beliefs and communication with school influence their involvement. Although it is difficult to change some of these barriers, parents' confidence, beliefs, skills, knowledge and communication with school may be changed because these relate to Hoover-Dempsey et al, (2005)'s parental involvement model; and according to this model, these barriers can be changed. In the next section, the possible ways to improve parental involvement by reducing these barriers are explained.

## **2.5 Improving Parental Involvement**

Improving parental involvement by eliminating the barriers mentioned in the previous section is important. The most important way to increase involvement is to give parents the needed help or guidance about their children's learning. In the literature, it is highlighted that many parents do not know how to help their children's learning (Fishel and Ramirez, 2005; Muir, 2012; Peters et al., 2008) and they lack the confidence and knowledge for involvement (Goodall and Vorhaus, 2011). Therefore, it is important to provide parents with what they actually need for involving in their children's learning. In the literature, different ways are mentioned to promote parental involvement in their children's learning with respect to what parent need for involvement. The focus of this study are on two strategies to help improve parental involvement. "Supporting parents to help their children learn" and "Using technology" are these two strategies. In this section, these two strategies are explained respectively.

### **2.5.1 Supporting parents to help their children learn**

Harris and Goodall (2007) described supporting parents to help their children learn as providing parents with the knowledge and skills that they need to help their children's learning. They invited parents to events hosted at school to facilitate their understanding of the curriculum, to give them advice about techniques for helping during revision, to improve their engagement with the school and to increase their aspirations. They used qualitative case study methods. By interviewing parents, it was found that the communication with their children, help with their children's learning and parent-child discussions about learning were improved.

Kaya and Lunden (2010) studied the interests and attitudes of elementary school parents towards science learning and "parent-to-child questioning". Observations, surveys and interviews were used for data collection in their study. They revealed that meaningful hands-on activities improved parents' support in their children's learning. Interviews and observations data also revealed that "Family Science Night" activities that include parents' questioning techniques improved parent-child interactions, parents' and children's attitudes to science, children's interest in science and parents' interest towards science subjects (Kaya and Lunden, 2010). Although there is some limitation in their study, these results can provide reliable evidence for the benefits of using science activities at home. According to Goodall and Vorhaus (2011), one of the most indirect

ways to increase parental involvement in their children's learning is to provide parent activities related to their children's classwork.

According to Stepanek (1998), the best activities for effective parental involvement are the activities that have "a fun, friendly, and relaxed atmosphere" for helping child's science and math learning. Family science nights are an example of this kind of activities where parent and child together try to solve or understand a problem about science. The other important aim of this activity is to make parents familiar with their child's school science work by improving their confidence about their abilities in science (Stepanek, 1998).

According to a report by Estyn (2009), it is found by interviewing and surveying a school, local authorities and parents from different schools that some schools succeeded in improving parental involvement with certain measures. These were: providing flexible time for parents' evening, helping with parents who do not know English, giving parents specific and clear information about their child's homework, giving parents outline sheets of the current subject or topic by selecting the easy ones, and encouraging them to use the proposed activities with their children at home (Goodall and Vorhaus, 2011). One of the most indirect ways to increase parental involvement in their child's learning is to provide parent activities related to their child's school learning (Goodall and Vorhaus, 2011).

### **2.5.2 Using technology**

The use of ICT to support children's learning at home can increase parental involvement (Goodall and Vorhaus, 2011). It can be used in three ways. Firstly, it provides parents with access to information about their children's school situations such as progress, achievement, attendance. Secondly, it creates a new type of communication between home and school. This communication offers email and text messaging to contact parents, school websites to supply the important information to parents and students, online reporting and e-portals for parents to follow their children's situations at school, and learning platforms which may include activities for parents and children to do together (Becta, 2008). Thirdly, ICT provides learning-related activities both for parents and children to do cooperatively as well as for children to do individually (Lewin and Luckin, 2010). Parents can reach the information when and where they want by using internet connected technologies (Becta, 2008).

The described benefits of technology are the rationale for using an interactive learning website in this study. Parent and children will use the science activities of an online website cooperatively and they learn and experiences science topics collaboratively when using this website together. More information about this website is explained in Chapter 4.4.

#### **2.5.2.1 Communication with parents by using technology**

The most successful way to increase parental involvement is to increase the communication between parents and school: “The cornerstone of effective family involvement is frequent, open, and two-way communication” (Stepanek 1998, p.11). It is important for parents to inform them how and when to involve themselves in their children’s learning (Russell and Granville, 2005). According to Hornby (2011) most parents have some form of communication with school about their children. They may require information about their children’s school, on-going activities at school, children’s issues, children’s progress and their own responsibilities as well as their own rights. On the other hand, schools also need information about students from their parents and families. This can be done through two-way communication between parent and school (Hornby 2011) in order for parents to understand their children’s learning at school and for teachers to understand parents’ and children’s interactions after school (Ho, 2007; Campbell, 2011).

Working cooperatively between home and school by sharing information and experiences about students is important for parents to understand their child’s learning at school and for teachers to understand parents and children after school (Ho, 2007; Campbell, 2011). Parents should be confident to communicate with the school when they need any help or information through using different kinds of communication options such as telephone, face-to-face, text message and email (Hornby, 2011). Therefore, the responsibility of the school should build parents’ feelings of confidence for communication (William and Sanchez, 2011).

##### **2.5.2.1.1 Thick-Thin communication strategies**

According to Grant (2010) communication with parents can be increased by using technology. While one-way communication which only flows from school to home may have a negative effect on parental involvement, two-way communication has a positive effect. Hollingworth et al. (2009) suggest thin-thick communication strategies including



four important components of communication: synchronicity; “personalisation; “complexity; and directionality:

- Synchronicity refers to the time of the communication: that it is fast, “real-time interaction” or can send later from school or from home.
- Personalisation is about the message that is sent by the school; whether the message is general and sent to all parents (e.g. school websites), or specific and sent to only one parent (e.g. specific email or text messages).
- Complexity refers to clearance or complexity of the message. For instance, email can have a clear or complex message.
- Directionality is about the direction of the messages from the school to parents, from parents to school or both ways (Hollingworth et al., 2009).

If the communication is synchronous, personal, complex and multi-directional, it is thick communication, but if it is asynchronous, generic, simple and one-way, it is thin communication. Email, text messaging, websites, online reporting, face-to-face and other technologies such as blogs, MSN or Facebook can be used for thick and thin communication strategies’ (Hollingworth et al., 2009; p.11-12).

Both thin and thick communications have some advantages and disadvantages. The usefulness of them completely depends on the context of the message that needs to be conveyed. While thin communications tend to be more flexible, less time consuming and less socially demanding of parents, thick communications need more time and resources. Both of these communications can have an influence on parents, but thick communications have more influence on parental involvement (Hollingworth et al., 2009; p.13).

The most successful way to increase parental involvement is to increase the communication between parents and school because more informed parents know what to do to help their child’s learning, but less informed parents do not know what to do (Hollingworth et al., 2009). Although in one-way communication which flows from school to home may have a negative effect on parental involvement, two-way communication has a very positive effect on parental involvement by letting the information flow in both ways from home to school and from school to home (Hollingworth et al., 2009).

Overall, some barriers of parental involvement may be overcome through helping parents to help their children learn and using technology. The use of an intervention that includes activities for parents and children to do at home and explaining the activities to the parents in more detail through effective communication may improve parental involvement and parents' confidence about helping their children. When parents are invited to get support on how to help they may tend to be more involved. Thus, if parents are more involved, this can provide benefits for them and their children. In addition, the use of technology in the intervention can facilitate the improvement of parental involvement and the change of parental outcomes.

## **2.6 Theoretical Model of Parental Involvement**

In the previous sections the benefits, the barriers and some ways of improving parental involvement explained. In this section, theoretical model of parental involvement that forms the basis of this study and how this model modified to suit this study are explained.

Hoover-Dempsey and Sandler (1995, 1997) suggested a parental involvement model to understand the reason of why parents involve in their children learning and how this effect their child's academic outcomes. Hoover-Dempsey and Sandler's (1995, 1997) parental involvement model explained why parents involve in their children's learning, what forms it take and how this effect their children's learning. Although the main purpose of this model was to improve parents' involvement in their children's learning, it provides a framework for understanding the process of the involvement and its possible effects on their child's educational outcomes (Walker et. al., 2005). This model constructed according to five consecutive levels (See Appendix J). These levels work between parents' basic decision to be involved in their child's learning (level 1) and children's educational outcomes (Level 5). Hoover-Dempsey and Sandler (2005) revised their first model (See Appendix J). In the revised model, the major changes were the combination of the involvement level I and II constructs under parents' choice of involvement activities.

This study is mainly focused on the parental involvement level I of Hoover-Dempsey and Sandler' (2005) revised model and this model was adopted to be the base of the current study. The parental involvement level I was constructed under three constructs: personal motivation, invitations and life context in Hoover-Dempsey and Sandler' (2005) study. However, this model was modified to suit the purpose of this current study by eliminating

the irrelevant “time and energy” and “general school invitations” components and combining “knowledge and skills” with “parental efficacy” components. The main reason of eliminating the two components were because the definition of this study limited to parents’ home based activates and communications with the teachers. Another reason of combining the other two components was that these two components were related and some of the questionnaire items were also similar. It thought that parents’ knowledge and skills related to their confidence in helping their child’s learning and the confidence is part of the self-efficacy of parents.

In this section, Hoover-Dempsey and Sandler (2005) ’s parental involvement level I model is explained. Firstly, parents’ role construction and parents’ self-efficacy are discussed under parents’ personal motivation section. Secondly, parents’ perceptions of invitations from others are covered. Finally, parents’ life contexts are explained.

### **2.6.1 Parents’ Personal Motivation**

This section explains Hoover-Dempsey and Sandler’s parental involvement model. Hoover-Dempsey and Sandler’s (1995, 1997) model propose that two beliefs systems influence the motivation to parental involvement. These beliefs systems were parents’ role construction for involvement and self efficacy for helping their child’s school learning (Hoover-Dempsey et. al., 2005). These two constructs explained below respectively.

#### **2.6.1.1 Parents’ role construction**

Parent’s role construction relates to parents’ beliefs about themselves for helping their children’s learning and arranging their behaviours according to these beliefs (Hoover-Dempsey and Sandler, 1995; Hoover-Dempsey et al., 2005). These include what they should do for their children’s leaning at home and what responsibilities should they have regarding their children’s learning (Hoover-Dempsey et. al., 2005). According Hoover-Dempsey and Sandler (1997), parents’ role construction have an influence on parental involvement because parents can see their actions regarding their children’s learning are valuable, needed and permissible when they have active role construction beliefs.

Parents’ individual and social experiences through their lives about their children’s education shape their role construction. Parents’ role construction can be changed due to its socially constructed nature. The importance of role construction in relation to parental involvement is that it can motivate parents to get more involved in their children’s

learning (Hoover-Dempsey et. al., 2005). Drummond and Stipek (2004) examined the motivational effect of role construction on African American, Caucasian, and Latino elementary children's parents' involvement. They concluded that parental involvement was motivated by their role construction beliefs. They also mentioned that parents' role construction beliefs were socially constructed. Recommendations from teachers about their help in their child's learning positively changed their beliefs about their roles.

Parents who are involved in their child's learning are generally parents who hold more positive role construction beliefs (Hoover-Dempsey et al., 2005; Green et. al., 2007). According to some studies conducted with elementary school age children's parents (Green and Hoover-Dempsey, 2007; Anderson and Minke, 2007) parents hold positive role construction beliefs regarding their involvement in their children's learning. In addition, parents' role construction predicts parental involvement at home (Green et al., 2007; Deslandes and Bertrand, 2005).

Anderson and Minke (2007) investigated the prediction of parental involvement from four constructs (parents' role construction, sense of efficacy, resources, and specific invitations for involvement) that proposed by Hoover-Dempsey and Sandler's model of parental involvement level I. Large sample of English and Spanish speaking parents of elementary school years' children were surveyed. The results of this study showed that parents' role construction beliefs and the invitations from teachers predicted parental involvement at home and at school. However, the effect of parents' self-efficacy of parental involvement was limited. Their results supported Hoover-Dempsey and Sandler's parental involvement level I .

#### **2.6.1.2 Parents' self-efficacy in helping their children's learning**

Bandura (1997) defined the self-efficacy as "beliefs in one's capabilities to organize and execute the course of action required to produce given attainments" (p. 3). Parent's self-efficacy relates to parents' beliefs in their abilities to get involved in their children's learning in order to produce positive differences in their children's learning (Hoover-Dempsey and Sandler, 2005). For achieving these positive differences, self-efficacy has an important influence on parents' decisions (Green et. al., 2007).

According to Walker et. al. (2005), self-efficacy theory regarding parental involvement suggests that parents' appraisal of their skills and knowledge as well as their actions following their decisions to yield positive differences in their children's learning have a

positive influence on their involvement. In other words, if they believe and see their abilities and actions are sufficient to increase their child's academic learning and achievement, they will more involve in their child's learning (Deslandes and Bertrand, 2005). This is valid across elementary, middle and high school children's parents (Green et. al., 2007). Therefore, according to Hoover-Dempsey and Sandler (1997), parents who have high self-efficacy in helping their children's learning tend to have more positive decisions for involvement, whereas parents with weak self-efficacy tend to have lower involvement. This is because their self-efficacy affects the difficulties or the challenges in order to achieve successful outcomes regarding their children's learning. Therefore, higher self-efficacy will eliminate the challenges they may face and increase their involvement (Hoover-Dempsey and Sandler, 1997).

Green et. al., (2007) investigated the relationships between Hoover-Dempsey and Sandler's revised parental involvement level I model with the levels of parental involvement. In addition, they also investigate the age of children on parental involvement. 853 parents of 1<sup>st</sup> through 6<sup>th</sup> grade children in the mid-southern United States participated in the study. They separated parental involvement as home based involvement and school based involvement. They found by surveying these parents that parent' invitations from others, the motivational beliefs and life contexts predicted both home-based and school-based parental involvement. However, parents' self-efficacy beliefs were a strong predictor of parental involvement at home. In addition, they also founded that parental involvement decrease when the child gets older.

Similar to role construction, self-efficacy is also socially constructed. The personal experiences of parents regarding successful involvement change their self-efficacy because the decisions by school and important others such as teachers affect parents' beliefs about their efficacy in helping their children's learning. (Hoover-Dempsey and Sandler, 2005). Bandura (1995) explained that mastery experiences, vicarious experiences, social persuasion, physiological and emotional states are the four forms that increase self-efficacy beliefs. All these forms increase self-efficacy beliefs separately. Mastery experiences refer to the positive experiences that resulted in success. Vicarious experiences are described as seeing others succeed or fail about their actions. Social persuasions refer to receiving persuasions from other about their actions. Physiological and emotional states refer to emotional concerns regarding performance (Bandura, 1995).

All these forms can be adopted for parents and these forms can be experienced in the intervention of this study in order to increase parents' self-efficacy beliefs.

### **2.6.2 Parents' Perceptions of Invitations from Others**

Invitations to parents from others to involve in their child's learning are one of the motivators of their decisions to get involved (Hoover-Dempsey and Sandler, 1997). The reason for this is because parents will think that their involvement is wanted, important and expected when they receive these invitations from others. These invitations can positively contribute to parental role construction and self-efficacy beliefs especially who have weak beliefs regarding these constructs. The most general sources of this invitations to parents derive from the schools, teachers and their children (Hoover-Dempsey and Sandler, 2005). Although these three sources are important, the invitations from teachers and their child are explained in this section.

#### **2.6.2.1 Parents' perceptions of invitations from teachers**

According to Green et. al. (2007), parents' perceptions of invitations from teachers motivate parents to become involvement in their children's learning across primary toward high secondary school children. These invitations from teacher are important in order to increase the sense of parents that their involvement in their children's learning valuable and desired (Green et. al., 2007). The main reason is because these invitations are a kind of responds to most of the parents who want to know how to contribute their child's learning (Hoover-Dempsey and Sandler, 2005). The forms of invitations from teachers to parents' involvement generally include improving the frequency of the communication between parent and teacher, providing useful ideas about how to contribute to their child's school work at home, engaging them with more home based activities about their child's learning (Coutts et. al. 2012). These invitations found to be important in order to improve parents' involvement in their child's learning. (Epstein and Van Voorhis, 2001; Deslandes and Bertrand 2005).

Epstein and Van Voorhis (2001) recommended that parents' decisions to become involved in their children's learning were highly influenced from the invitations from teachers for involvement in their children's schoolwork at home. These kind of invitations are proven to increase parents' involvement and conclusively more homework

completion and performance for children. Some studies (Clossen et. al., 2004; Simon, 2004) reported positive relationships between invitation from teachers and parental involvement (Hoover-Dempsey and Sandler, 2005).

#### **2.6.2.2 Parents' perceptions of invitations from their child**

Parents' perceptions of invitations from their child for helping their learning can contribute to their involvement. This kind of invitations from the child have encouragement effect on the behaviours and choices of parents to get involved in their children's learning (Walker et. al., 2005). As it is stated by Green et. al. (2007) parents' decisions to become involved in their children's learning increase when their child invites them to help because most parents want their child to be successful both academically and developmentally and they can provide the best about what they can do regarding their children's needs for their learning.

Parents may need to respond either implicit or explicit invitations of their children needs (Walker et. al., 2005). According to Hoover-Dempsey and Sandler (2005), children implicit invitations include no direct request from their parents in order to help in their learning. Rather it depends on the observations of parents regarding their child's difficulties in their learning. Such as when the child gets low grades in their learning, parents feel to be more involved in their child's learning. That is the non-direct invitations of children to get help from their parents. On the other hand, the explicit invitations contain direct request from their parents to help in their learning or to participate a special event at school. This kind of invitations derived from the wishes of the children. This increase the involvement of parents because they see their child needs and values their help in order to achieve their educational goals (Hoover-Dempsey and Sandler, 2005).

Deslandes and Bertrand (2005) conducted a study to predict home and school-based parental involvement from the parental involvement level I and II constructs of Hoover-Dempsey and Sandler's (1995, 1997) model which were parents' role construction, self-efficacy and perception of invitations from the teacher and child. They surveyed 770 parents of 7<sup>th</sup> to 9<sup>th</sup> grades children. They concluded that the distinction should be made between parental involvement at home and at school when these constructs used. Although their results differ according to grade levels, parents' perceptions of invitations from their child was the most important predictor of parents' involvement at home for all grade children's parents. Parents' role construction and self-efficacy was also important

predictor of the involvement of 7<sup>th</sup> and 9<sup>th</sup> grades children's parents. This study provided an evidence about the importance of these constructs for predicting the parental involvement at home. In addition, they stated that parents' involvement at home and at school increase if parents receive invitations from teachers and their children to help their children learning.

Strickland (2015) investigated the effects of parental motivational beliefs, invitations for involvement, and life context on parental involvement at school and at home. They collected their data by survey from 174 6<sup>th</sup> grader children's parents. Their results showed that parents' invitations from others have positive effect on both parental involvements at home and at school, but the effect on school-based involvement was higher. Moreover, they found a moderate positive effect of parents' life context on parental involvement at home. However, they couldn't find any effect of personal motivations on both forms of parental involvement.

Overall, as Hoover-Dempsey and Sandler (2005) suggested invitations both from teachers and children have a powerful motivator effect on parental involvement. Special, well-planned and cautious requests from teachers to be involved in their children's learning serve as a useful help for most parents in order to respond their wishes regarding how to support their children's learning. Moreover, the invitations from children as their needs or suggestions of teacher increase parents' desires to help their children both educationally and developmentally. In turn, this leads to more active parental involvement (Hoover-Dempsey and Sandler, 2005).

### **2.6.3 Parents' Life Contexts**

According to Hoover-Dempsey and Sandler's (2005) revised model, the life context elements of parents have also a motivator effect on their decisions to become involved in their children's learning. These elements are their skills and knowledge as well as their time and energy. Since the skills and knowledge are related to parents' self-efficacy, this were used as a component of parents' self-efficacy in the main study. In this section the elements of parents' life context are explained according to the Hoover-Dempsey and Sandler's model.

#### **2.6.3.1 Parents' personal skills and knowledge**

Parents decisions to become involved in their children's learning are affected from their personal skills and knowledge that they need to use when they are helping their child's



learning (Hoover-Dempsey and Sandler, 2005). If parents believe that they have the necessary skills and knowledge about how to be helpful with their child's schoolwork or learning, they will be more motivated to involve (Strickland, 2015).

Parents' personal skills and knowledge can be different for different subject and this effect their decisions to be involved at this subjects (Hoover-Dempsey and Sandler, 1995). For example, a parent who has skills and knowledge in social studies than in science is more confident to help with their child's social studies' homework than science homework. This is relevant to their perceptions of their skills and knowledge. When parents feel that they have the necessary skills and knowledge about an activity that their child's struggled, they can help their child. However, if they do not have the skills and knowledge about it, they can direct their child to get help from others such as child's siblings, teachers or close relatives (Hoover-Dempsey and Sandler, 2005).

According to Hoover-Dempsey and Sandler, (2005), parents' personal skills and knowledge tend to decrease when their child get older. This affect their motivations and decisions to be involved in their children's learning. The main reason of the decrease of parents' involvement across the grades of their children is linked to parents' decreased skills and knowledge in helping their children's learning because the school subjects get harder and parents' help become not sufficient for the children. This decrease is also related to the changes to more complex school and child's developmental changes for autonomy (Hoover-Dempsey and Sandler, 2005),

Overall, parents' personal skills and knowledge are important for parents' decisions to be involved in their children's learning. However, children's school subject and grades may increase parents perceived skills and knowledge to help their children in their school works. Regarding this study, parents' personal skills and knowledge were combined with self-efficacy construct.

#### **2.6.3.2 Parents' Time and Energy**

Parents' time, energy and other family responsibilities influence their involvement in their children's learning. Especially parents whose have inflexible work schedule involve less than parents who have flexible work schedules. In addition, parents who have more than one child or other family responsibilities tend to be less involved (Hoover-Dempsey and Sandler, 2005). Parents' time and energy can affect parents' ability and motivations

to become involved in their children's learning (Strickland, 2015). This construct act as a barrier for parental involvement.

Overall, parental role construction, self-efficacy, invitations from teachers and their child as well as their personal skills and knowledge tend to have motivator role in parental involvement in their children's learning. Since these constructs socially constructed, it will be attempted to improve these constructs via an intervention to increase parental involvement both in their child's general and science learning at home.

## **2.7 The Effectiveness of Parental Involvement Interventions**

Parental involvement has many positive benefits on their children's academic outcomes based on some of longitudinal and quantitative studies. However, there is mixed effects of parental involvement interventions on their children's outcomes in the literature. The argument about these mixed results and the effectiveness of parental involvement are explained in this section. In this section, firstly, some of the imported meta-analysis about the effectiveness of the interventions are reported and then some of the intervention studies follow.

Parents' involvement in their child's general and science learning can be improved by using an intervention based on the recommendations in the literature for helping parents to know what to do during their child's science learning at home through giving parents the necessary information and guidance. Although the effectiveness of interventions on parental involvement is not robust in the literature (Mattingly et al., 2001; Desforges and Abouchaar, 2003), some studies state that the evidence for using interventions to promote parental involvement is clear enough (Jeynes, 2007).

Mattingly et al. (2001) analysed 41 studies to find the effects of parental involvement intervention studies on child's academic outcomes. Their focus was only on the studies that report outcomes and give information about their methodical design. They found little empirical evidence from these studies about the effects of parental involvement intervention studies on children's academic outcomes, but they did not find the programmes to be ineffective. In addition, they found that these studies had many methodological weaknesses such as sample size, not using a control. Although these studies were methodically weak, fifteen of these studies reported positive outcomes. While five of these studies used control groups, only four of them used matched design

pre- and post-intervention for control groups. Therefore, it can be said that only four of these 41 studies can be used to draw conclusions about the effectiveness of parental involvement programmes.

Fishel and Ramirez (2001) stated that general conclusions about the effects of parental involvement programmes from many studies cannot be drawn due to methodological weaknesses such as lack of control group. A gap exists in the literature about the evidence base of the interventions for parental involvement. Some of the existing evidence about interventions is not strong enough or drawn from poor methodological studies and the existing clear evidence is not enough to show the effects on educational outcomes (Goodall and Vorhaus, 2011).

On the other hand, Jeynes (2007) conducted a meta-analysis of 52 studies to find the effects of parental involvement interventions. These studies were selected according to the quality, the uses of random assignment and the definition of parental involvement used. Jeynes concluded that there is clear evidence of the effectiveness of parental involvement programmes. Nye et al. (2006) studied eighteen randomised controlled trials studies to find the effects of parental involvement programmes on child's academic outcome. They found from these studies that there is a positive and significant effect of parents' intervention programmes that provide parents with education and training to increase their general involvement in their child's school performance. They also stated that this effect is clear enough for parents, schools and policymakers for implications. If parents attended the activities designed to improve school performance of their children at home, this would lead to positive outcomes in their child's performance at school (Nye et al., 2006). Caspe and Lopez (2006) studied experimental and quasi-experimental evaluations about the effects of intervention programmes. From these evaluations, they concluded that "family-strengthening programmes have a positive impact on four main parenting processes: family environment, parent-child relationships, parenting, and family involvement in learning in the home and at school" (p.15). They also concluded that these programmes can change child's academic outcomes in a positive way.

The parental involvement programmes can help parents to become more confident in helping their child's learning because these programmes help parents to equip themselves with the necessary knowledge, skills and understandings during their involvement as well

as helping them get support from school and from other parents to increase their confidence (Kane et al., 2007).

Jeynes (2012) examined the effects of different types of parental involvement programs on various age group children's academic achievement in their meta-analysis of 51 studies. The analyses of this study showed that there is a significant relationship between parental involvement programs and children's achievement for all ages children. More specifically the parental involvement programs that engage parents and their child's reading together, encourage parents to regularly controlling homework and increase parent-teacher communication tend to lead higher academic outcomes for their children.

In order to examine the relationships between parental involvement and children's academic achievement, Wilder (2014) conducted a meta-analysis of nine meta-analyses that examined this relationship. It is founded that there was a positive relationship between parental involvement and children's academic achievement. This result was valid across different definitions of parental involvement and measurements. However, this relationship was higher for the studies that used parental involvement definition as the expectations for their children's educational achievement. On the other hand, the relationship was lower for the studies that used parental involvement definition as helping with their children's homework. In addition, this positive relationship was valid across age groups of children and different ethnic groups.

See and Gorard (2013) reviewed the literature to find the casual relationships between interventions and parental involvement. Their purpose was to find about the most effective parental involvement programs for primary and secondary age groups children and how these programs effect children's educational outcomes. They reviewed 68 studies that met their quality assessment criteria. Their assessment criteria based on the studies that they investigated desired aims, used methods that provide casual evidence (experimental studies) and provided clear explanation about their findings. Their main finding was that the parental involvement intervention studies failed to provide empirical evidence about parental involvement increase their children's educational outcomes for primary and secondary schools' children. Specifically, they did not find any high-quality studies and only seven of these 68 studies were medium or near medium quality according to their quality assessment criteria. There were mixed results from these seven studies. While four of them reported positive effects of parental involvement, three others

suggested negative or no effects. The main reason of the most of 68 studies were low quality studies because big majority of them had serious methodical issues such as had small sample sizes, did not use randomization, did not have suitable control and experimental groups, encountered serious dropout and misused of analysis technics.

Topping et al. (2004) investigated the effect of Duolog Maths, which is method for parents to involve in their child's maths learning as a tutor. Thirty children (from a primary school) and their parents attended to this study. Participants were randomly allocated to experimental and control groups. Experimental students (n=17) received mathematical tutoring from their parents using Duolog math, but control students (n=13) only received traditional maths homework. Experimental students' parents were trained to use this method with their children at home and they asked to use this method once a week at their home. The results indicated that there were no differences between experimental and control groups' pre and post-tests for attitudes towards math, but there were positive small effect sizes differences for maths achievement in favour of experimental group and especially for male students. However, this study was methodologically weak because there was limited explanation of the research method and how the experimental and control students treated during the intervention. In addition, the confounding variables, which may have an influence on the results were not explained.

Adadevoh (2011) used a small size experimental study with 28 primary school children. The study investigated the effect of using computers with parental monitoring for reading, maths and language arts. Experimental and control groups were used. Experimental students used computers with parent monitoring, but control group used computers without parent. The study reported that children who used computer with parental monitoring get better achievement score for language, reading and maths. The effect sizes differences were positively large for three subjects. However, this study did not explain how the groups allocated and how the confiding variables controlled.

Another home learning intervention that encourage parents to involve in their children's homework activities at home is the home-education literacy program (HELP), which undertook by Morrison (2009). The intervention includes weekly storybooks activities to parents for reading comprehension. Four experimental (n=74) and four control groups (n=72) were assigned from primary school children. The intervention took 12 weeks. It reported positive effect of the intervention on parental efficacy and parental involvement

for experimental parents, and it also reported the intervention had positive medium effect on experimental students' reading comprehensions. However, this study did not explain how the groups formed and self-reporting were used for parental self-efficacy and involvement.

In another study, Ndaayezwi (2003) investigated the effect of an intervention that involves schools and parents to work together. Teachers arranged home visits to increase the communication between parents and the school. The participated parents received several home visits from teachers during one year. Sixty experimental and control students randomly allocated to the groups. Students undertook outcome measurements test regarding their school subjects and school attendance. Positive effect size differences were reported for academic outcomes. In addition, qualitative data reported that parents became more aware of what their children are doing at the school.

Sirvani (2007) investigated the impact of parental homework monitoring intervention on their children's test performance. Parents were given homework monitoring sheets two times in a week to inform them about their children's test scores. The intervention took 12 weeks and the control parents received the usual progress report. Four classes of a teacher randomly assigned to experimental and control group. Positive medium effects on children's achievement and homework completion were reported in favour of the experimental groups. However, there were limited explanation of how the experimental and control groups separated. There could be issues that parents' who get more reports, may involve more than other parents and experimental students may get more support and interest from their parents. These may have led to better achievement.

In a further study, Ho (2007) investigated the effects of two types of parents' involvement strategies on their children's achievement in math, parental efficacy, encouragement and home involvement. Parents' workshops and communication via newsletters were the two strategies that used as the intervention in this study. An experimental research with primary school children and their parents was used. Children were randomly allocated to three experimental groups and one control group. Parents participated to training sessions for four weeks. The experimental groups separated to three groups as workshop only, workshop and communication, and communication only group. the workshops group parents received home math kits to increase parents use of home activities in order to increase children's interest towards math. The other two groups received newsletters that

includes information and ideas about parental involvement in their children's math learning at home. The study reported that the workshop and communication group gain more in their math test and there were no significant effects on any parental outcomes. However, the qualitative data of this study reported positive effects of workshops on parental efficacy.

Overall, there was mix results about the effectivity of parental involvement in their children's educational outcomes. Most of the meta-analysis suggested the effects of parental involvement interventions on their children's educational outcomes was positive (Jeynes, 2012). However, according some meta-analysis (See and Gorard, 2013) this effect is not clear because most of the intervention studies have serious methodical issues and the studies that reported positive effect did not base on the robust methodological studies which provide empirical evidence. This study based on the elimination of the methodological issues that suggested in the literature about effectiveness of an intervention. Therefore, this current study can provide evidence for the effectiveness of parental involvement intervention.

## **2.8 Different Types Parental Involvement Interventions**

The importance and benefits of parental involvement in their children's learning highlighted in many studies in the literature. Many parental involvement programs are designed to improve parents' involvement in their children's learning for contributing their education. Different types of parental involvement programs developed according to available definitions of parental involvement in the literature. As discussed in section 2.2, parental involvement has different forms and definitions, and parental involvement programs in the literature mainly base on these forms and definitions. In this section, some types of parental involvement interventions are discussed.

Capse and Lopez (2006) reviewed the family strengthening programs in the literature. The main purpose of this study was to highlight the most promising parental involvement programs in order to help schools and educational organizations. Thirteen studies identified according to their methodologies and intervention programs. Experimental and quasi-experimental studies that provide reliable results about the efficacy of a program were chosen. They reported that the family environment, parent-child relationships, parenting and parental involvement programs helped to contribute children's learning at home and at school. In addition, they reported these programs can increase children's

educational outcomes. *Family environment programs* helped to increase the characteristics of the home by improving physical setting, parents' well-being' family functions, communication and parental confidence. *Parent and child relationships programs* helped to enhance and strengthen the communication between parents and their child. *Parental skills programs* were targeted to increase parents' skills in parenting and behavioural management. *Parental involvement in their children's learning programs* targeted to improve parents' supports in their children's learning and relationships with schools (Capse and Lopez, 2006).

Jeynes (2012) conducted a meta-analysis of 51 studies that investigated the effectiveness of different parental involvement programs on children's academic achievement. Several parental involvement programs are discussed. These programs are: general parental involvement, shared reading, emphasized partnership, checking homework, communication between parents and teachers, head start and ESL teaching programs.

*General parental involvement programs* designed to involve parents in their children's education process. This type of programs planned to increase parents' involvement in their children's learning through helping with homework, getting teacher's supports or equipping parents with the needed skills and knowledge. *Shared reading programs* included the activities that encourage parents and children to read together. *Emphasized partnership programs* refer to the collaborations between parents and teachers in order to focus and enhance children's educational outcomes or resolve their behavioural issues. To do this, parents and teachers follow strategies, rules and expectations for supporting students' learning and their life. *Checking homework programs* involve parental involvement activities that engage parents to regularly check their children homework and request parents' confirmation whether their child completed their homework or not by signing a daily statement as their duty. *Communication between parents and teachers' programs* planned to enhance the communication between home and school. *Head start programs* refer to special programs that aim to explain the importance of parental involvement to parents. *ESL teaching programs* refer to English teaching programs that prepared for non-English spoken parents in order to increase their English level that help them to be more involved in their children's education (Jeynes, 2012).

Jeynes's (2012) study concluded that "parental involvement initiatives that involve parents and their children reading together (i.e., engaging in "shared reading"), parents



checking their children's homework, parents and teachers communicating with one another, and partnering with one another have a noteworthy relationship with academic outcomes" (p.730), but Head start and ESL training programs were not effective. Jeynes explained that the programs that targeted to support parents to help their children's learning succeed because most of parents want to help their children's education and their involvement will increase with the help of a supporting program. This will result to better educational success for their children. In addition, teacher guidance can contribute to the involvement of parents in their children's learning.

Fox and Olsen (2014) supported Jeynes (2012) results regarding shared reading and communication between home and schools. They explained that shared reading is the most beneficial type of parental involvement that have an influence on children's educational outcomes. In addition, communication about children's progress, giving information about what their children are learning and useful strategies that help parents to involve in their children's learning are important for parental involvement (Fox and Olsen, 2014). As explained before, the communication between home and school is important for both parental involvement and children's learning. The communication strategies can involve using technologies, phone calls, face-to-face visits, which in turn, can have an impact on children's educational outcomes.

Conversely, See (2015) reported that there is no promising results of any parental involvement programs on children's educational outcomes. See (2015) investigated parental involvement interventions in order to identify the most promising approaches of parental involvement that result with a positive effect for children's educational outcomes. They examined the interventions that conducted with primary and transition phase children. Parental involvement interventions categorised according to home-school collaboration, use of technology, skills training, home literacy, parents' homework involvement and others. See (2015) explained each types of parental involvement interventions as the following: *skills training* is the programmes targets to equip parents with the skills to help their children's reading, maths, parenting, behaviour management and interactions with their children as well as communication. *Home-school collaboration* includes the programs that conducted by schools to involve parents in school's activities or in their children's learning at home. *Home literacy programmes* involve helping parents to involve in their children's reading and literacy activities at home. *Use of technology* is the programs that promote the use of technology for following

children's progress and their school work as well as increasing the communication with schools. *Parents' homework involvement* is the programs that involve parents to assist their children's homework at home. Training parents in order to assist their children's learning at home are the most used type of intervention. This followed by family literacy and home-school collaboration programs respectively.

See (2015) concluded that although 27 of 53 reviewed studies reported positive outcomes, no studies found to be effective or promising because almost all these studies have methodological weaknesses that influences their results. In addition, the effects of parental involvement interventions provide mixed results.

Different types of interventions were used in the literature to test the effect on different outcomes (children's educational achievement for different subject especially reading, reading and writing skills, math skills and knowledge, cognitive skills, parental involvement, communication between parents and school). In the literature, big majority of the parental involvement interventions provide parental training for parents to help their children's learning, (mostly in reading, some with maths and few with science). These trainings include how to interact with their children's reading (Bekman, 2004), how to increase their children's math (Starkey and Klein, 2000) and reading skills (Roberts, 2008; Landry et al., 2011), how to use home tutoring (Topping et al., 2004), how to work with their children's science learning (Wehrell-Chester, 1994), how to use strategies and concepts of maths (Brodsky et al., 1994) and how to use school teaching strategies for their children's reading at home (Williams, 2008). Some other studies provide parents with materials, instructions or guidance. Providing parents materials and resources to help their children's reading skills (Boggess, 2008; Calnon, 2005), school providing guidance and information to parents about their children's homework (Albright, 2002), computer based instructions and parents' monitoring (Adadevoh, 2010) are some research used this type of intervention. Remaining studies include parents in their children's homework. Some examples of these studies are: Teachers involve parents in their children's school works with using interactive science homework (TIPS) (Balli et al. 1997; Van Voorhis 2001, 2011), using computer with parents to help their children's learning (Tsikalas et al., 2008), and weekly homework activities for parents (Morrison, 2009).

The results from these interventions provided mixed effects on several parents and children's related outcomes. Most of the parental training studies reported positive effects on children's reading (Boggess, 2008; Bekman, 2004), reading skills (Landry et al., 2011), math knowledge (Starkey and Klein, 2000), math achievement (Brodsky et al., 1994), science achievement and attitude (Wehrell-Chester, 1994). In addition, providing materials and instructions reported to be effective on maths and reading (Boggess, 2008; Adadevoh, 2010), parental involvement and self-efficacy (Morrison, 2009), but some studies reported no effect on math (Bekman, 2004), homework completion and achievement (Albright, 2002), and communication between school and home (Albright, 2002). Regarding parental involvement in children's homework, the results are also mixed. TIPS helped to increase maths, science achievement (Van Voorhis, 2011; Van Voorhis, 2001) and parental involvement (Van Voorhis, 2011), but Balli et al. (1997) reported no effect of TIPS on math achievement.

Although there are mixed results about the effectiveness of parental involvement interventions. Shared reading, skills training, parent-teacher communication, use of technology and parental involvement in homework are the types of interventions that mostly used in the literature. Parental involvement in homework, communication between parents and teachers, and the use of internet are some aspects that used in the intervention of this current study.

## **2.9 Conclusion**

Parental involvement can contribute to and facilitate the improvement of their children's outcomes even though the research evidence has mixed results. Although the multidimensionality of parental involvement creates many barriers, there are some effective ways to decrease some of these. Helping parents to support their children's learning and using technology are two ways that can be used to improve parental involvement in their children's learning. As the literature suggested parental involvement is beneficial to their children's learning, it is important to increase parents' involvement in their children's learning. To achieve this, it is also worthwhile to investigate the main barriers that effect parents' involvement in their children's learning. Most important barriers to parents' involvement mainly related to parents' responsibilities, abilities, confidences and the expectations of others from parents. A model in the literature that covers these barriers was Hoover-Dempsey and Sandler (2005) model and therefore, this

model adopted as the underlying model of parental involvement that used in this study. According to Hoover-Dempsey and Sandler (2005) model of parental involvement, parental role construction, self-efficacy, invitations from teachers and their child as well as their personal skills and knowledge tend to have motivator role in parental involvement in their children's learning. Since these constructs socially constructed, it will be attempted to improve these constructs through an intervention to increase parental involvement both in their child's general and science learning at home. In addition, this model mainly involves parents' direct involvement in their child's learning, which covers the definition of this current study that explained in section 2.2 of this chapter. However, there is mix results about the effectivity of parental involvement interventions, this study tried to eliminate some of the methodical issues that prevent empirical evidence.

## **CHAPTER 3: THE USE OF TECHNOLOGY, ATTITUDES TOWARDS SCIENCE AND PARENTAL INVOLVEMENT IN HOMEWORK**

Since online science activities of a learning website used to increase parents' interactions in their child's science activities at home in order to increase both parental involvement and parents' attitudes towards science, this chapter explains the use of technology, E-learning, attitudes towards science and parental involvement in homework respectively from the literature and it ends by explaining the TIPS interactive homework.

### **3.1 The Use of Technology**

In this section, the role of technologies in science learning, the benefits of technologies in parental involvement and some barriers of using ICT for parental involvement are shortly explained.

#### **3.1.1 The Role of Information and Communication Technology (ICT) in Science Learning**

The use of Information and Communication Technology (ICT) in all areas of the workplace and education has been increasing dramatically in the last two decades. It is important to know the effects of technologies in student life and their learning (Alev, 2003). ICT is used in educational institutions for improving child's learning processes by facilitating these processes in order to follow new knowledge as well as directly and indirectly supporting their education both at school and at home. In addition, technology can be used as an effective learning tool (Romeo, 2006). New technological developments lead to enhanced teaching and learning resources for students to use both in their class and at their homes. (Lefebvre et al. 2006). The ICT provides several benefits in science education. These benefits include increasing children motivations, skills and knowledge towards science, provide enhanced pedagogical supports to science teachers through enhancing problem solving activities and children involvement in science learning, improving student assessment and feedback, and connecting different groups together (Bingimlas, 2009).

According to Lavonen (2008), the use of ICT in science education can:

- “make learning active, constructive, contextual, co-operative, self-regulated, reflective and cumulative and engages students in tackling the topic to be learnt in such a way that they create meaningful and understandable knowledge structures on the basis of a goal of learning,
- enhance interest, motivation and participation in activities,
- provide access to resources (web pages, texts, databases, videos, demonstrations, applets) that are of high quality and relevant to scientific learning,
- help students to focus attention on over-reaching issues, increasing salience of underlying abstract concepts,
- enable visualisation and manipulation of complex models, three-dimensional images and movement to enhance understanding of scientific ideas,
- support exploration and experimentation by providing immediate, visual feedback,
- help students to learn to use ICT or increase their digital competence,
- expedite and enhance work production and offer release from laborious manual processes and more time for thinking, discussion and interpretation,
- increase currency and scope of relevant phenomena by linking school science to contemporary science and provide access to experiences not otherwise feasible”  
(Lavonen, 2008, p.23-24).

Cox et al. (2004) found from the literature that the specific uses of ICT related to school learning have a positive influence on child’s achievement, especially in math and science and less in other subjects. They also stated that home use of ICT can improve the learning experiences and skills of children. Becta (2003)’s study is concluded by studying national data of secondary schools’ ICT and educational standards that the effective use of ICT learning opportunities has a significant relation with students’ achievement, attitudes, attendance and behaviour as well as parents’ opinions about school. Baggott La Velle et al. (2003) stated that ICT can improve students taking responsibility in their learning, increase their interest and pleasure of learning as well as their attitudes and motivation.

ICT has a number of important potentials in the education system as it improves students’ involvement in learning, changes the practice of teaching and generates new ways for parental involvement. In relation to parental involvement, ICT offers huge opportunities for parents to improve their involvement in their child’s learning by providing meaningful activities for parents and children to do together and by providing easier and effective

ways for communication both between parent-teacher and parent-child (Penuel et al., 2002). The internet can be an important source for science learning due to providing searching, interpreting and questioning the source of information. In addition, ICT can develop student scientific reasoning and analytical approaches (McFarlane and Sakellariou, 2002).

Although new technologies and ICT have several benefits for children, some studies indicated that there are some negative effects on children. According to Bingimlas (2009), student inappropriate use of the internet can take their most of their time and this can prevent their learning. On the other hand, it is argued that technology has the potential to improve science learning, but the used technologies should have direct connection with the objectives, aims and activities of science learning. Otherwise, the effectiveness of the use of technology will decrease (Newton and Rogers, 2003). In addition, due to vast majority of different types of websites that serve for different purposes, students need to use the internet with the guidance of their parents or their teachers. Student should be controlled with the use of the internet because they may easily reach to the inappropriate websites or unsuitable materials (Petursdottir, 2012).

There are some other potential risks of technology use for children. According to Kabakci et. al. (2008) study about the use of internet, it is reported that technology can have possible risks concerning content, individual, psychological and physical aspects. The most serious problem of the internet use is the easy access to any pornographic content, which it affects children negatively. The other important problems of the use of internet regarding individual aspect are that the possible communications with unreliable persons online and spending lot of time for communication with friends, which can lead to less studying at home. Another issue regarding physiological factors, the use of internet may lead to spend lot of time online. The children may become addicted to the use of internet and in turn, this can affect family relationships (Kabakci et. al., 2008). Parents should be aware of the possible risks of the internet use, and they should limit and control their child's use of internet.

Overall, the use of ICT for science learning may help to convey these benefits to parents and their children. In turn, this can help parents and their child to increase their child's knowledge, understanding, skills, attitude and beliefs about technology and the use of technology in science learning.

### **3.1.2 The Benefit of ICT for Parental Involvement**

The importance of parental involvement with their children and the need for more involvement is mentioned in the previous chapter. The most important benefit of using ICT for parental involvement is because it provides opportunities to increase parental involvement in their child's learning at home (Goodall and Vorhaus, 2011). ICT can be generally used in three ways to improve parental involvement. The first supportive way of ICT in improving parental involvement is that it provides parents to access update information about their child's school situations such as progress, achievement, attendance and behaviour. The second way is technology can provide a new type of communication between home and school. This communication offers email and text messaging to contact parents, school websites to supply the important information to parents and students, online reporting and e-portals for parents to follow their child's situations at school, and learning platforms which may include activities for parents and children to do together (Becta, 2008). The third way is that ICT provides learning-related activities both for parents and children to do cooperatively and for children to do individually (Lewin and Luckin, 2010).

Technology can offer parents to reach any information regarding their child in their convenient times; when and where they want by using internet connected ICTs (Becta, 2008). In addition, Becta (2008) provided more benefits of using technologies for parental involvement. These benefits are:

- Latest information about the child's education can be easily accessed by parents when and where they want through a convenient way of ICT.
- Parent becomes more involved in their child's learning.
- Learning and teaching become more effective when using ICT.
- ICT provides more flexible working arrangements for staff.
- Technology can improve parents understanding of their child's school life.
- It can make parents more capable of helping their children to learn.
- It can directly help parents to increase their child's achievement.
- It can improve parents' communication with teachers.



### **3.1.3 Barriers of Using ICT for Parental Involvement**

Although many children have a computer in their home, most of these children do not use computers for educational purposes. Computers are mostly used by many students for playing games. This can create a gap for some children in the use of computers for different purposes at home and at school and this may have an impact on the effective use of computers on child's learning (Harris, 1999). According to Lewin and Luckin (2010), parents wanted encouragement from school to use ICT to help their child's learning by providing them with clear and necessary information about activities that increase parent-child cooperation, about school subjects and about how to support their child's learning.

There are some barriers that prevent parents from using technology effectively to support their child's learning. These barriers include:

- Parents' worries about the safety of ICT use.
- Parents' worries about doing something wrong while helping their children to learn.
- Parents' lack of necessary skills in terms of using ICT.
- Parents' thoughts about child's independent learning.
- "Differences between having access to the technology and using it" (Hollingworth et al., 2009; p.48).

Hollingworth et al. (2009) suggested some parental needs to increase technology use with their child's learning. Parents want to know about how to use technology safely, which kinds of technologies and learning websites are being used at school and how they can utilize them to support their children, suggested educational websites and software and what are the advantages of having technologies at their home. In addition to these, parents need to know about their child's educational progress and information or knowledge about teaching methods and curriculum subjects (Becta, 2010).

In relation to the use of technology in learning purposes for helping children at home, parents can learn the use of ICT with their children, learn skills for supporting their child's home learning and can learn the use of ICT from their children (Grant 2010). Grant (2010) stated that learning with parents through using ICT and online connection has a great effect on parents' understanding of their child's education and parents' involvement with suggested activities. In addition, Parents can easily reach the information about their

child's learning offered by school websites, email or other kinds of communication options. Parents can be informed about their child's current subjects and activities, and they can access suggested websites to help their child's home learning (Becta, 2009). Moreover, many children may know how to use technology better than their parents. Some activities can be arranged for parents to learn about technology from their children. Many parents may say that they learn the use of ICT from their children (Grant, 2009).

Overall, the ICT can improve parental involvement by facilitating the communication between home and school and by supplying activities that both parents and children can enjoy. However, there are some barriers for parents about the use ICT for parental involvement. These barriers are lack of skills and misunderstanding about its benefits. These barriers can be eliminated through explaining its usefulness by an intervention program. In addition, parents need to be informed about the potential risk of the internet use of their child. When parents use ICT effectively to help their child's learning, this may improve both parents' and their child's education-related outcomes. Although there are limited studies about the use of ICT for parental involvement in science education, the use of ICT may provide benefits for parental involvement in science learning. Therefore, the intervention of this study based on using computer and online science activities of a generally used learning website ('Ttnet Vitamin') in Turkey.

### **3.2 The Use of E-Learning**

Since an online website are used in the intervention of this study, it is important to describe e-learning and explains some of the benefits and drawbacks of it. This section first explains e-learning and then, moves to explain the benefits and the drawbacks of E-learning.

Over the last decades, the use of digital and social networking technologies has increased and the use of these technologies in learning and teaching has also grown lately (Button et al., 2014). The use of internet has also used broadly by students and teachers as an important tool to reach research and learning materials for obtaining and sharing information. E-learning incorporates the use of technologies and the internet as learning and teaching materials in education (Arkorful and Abaidoo, 2014). Rosenberg (2001) describes e-learning as 'the use of internet technologies to deliver a broad array of solutions that enhance knowledge and performance' (p. 28). Similarly, the European Commission (2001) explains e-learning as the utilise of the internet and technologies in

ways to enhance the quality of learning and teaching due to providing easier access to educational facilities, services and materials. Morrison (2003) reported a broad definition of e-learning as “E-learning is the continuous assimilation of knowledge and skills by adults stimulated by synchronous and asynchronous learning events and sometimes knowledge management outputs, which are authored, delivered, engaged with, supported, and administered using Internet technologies” (p.4). According to short definition by Abbad et. al (2009), E-learning is any electronically enabled learning. All available electronic data can be used in applications and processes of E-learning to enhance learning and teaching. To do that, computer and web based learning, and mobile technologies can be collaborated to be used for educational purposes (Eklund et al., 2003). All these definitions cooperate to a definition of e-learning as the use of technologies in learning and teaching processes to easy and enhance the understanding, experiences and the success of individuals and students.

Due to easy adaptation to the classroom environment, e-learning is preferred by schools and educational organisations. E-learning provides several educational benefits due to the adaptation to the teaching and learning setting (Mylonas et al. 2004). The use of internet via e-learning offers many activities to be used in the classroom, which can support practice and children’s development (Margolin et al. 2011). Lin et al. (2006) stated that e-learning has the opportunity to advance children’s learning experiences, critical thinking skills, increase the communication between teachers and children, and improve learning. Children have the opportunity to reach and experience different types of techniques and activities with the use of learning and this helps to their understanding and improvement in their learning (Conole et al. 2006). Innes et al. (2006) emphasis that web-based teaching provides effective learning to children. In addition, the use of online learning expands the access of useful materials, increase student-centred learning and make students to become more flexible in their studies. Online learning can provide better learning than the traditional methods (Innes et al., 2006).

Many studies reported the educational benefits and advantages of e-learning. The main advantage of e-learning is the ability to provide the needs of individual learners. The focus of e-learning on individual learners’ needs is important because it is an educational process that is not teachers’ or schools’ needs. In a literature review study by Arkorful and Abaidoo (2014), the effectivity of the use e-learning in teaching researched. This study summarised the following advantages of using e-learning in education:

- It provides flexibility of time and place to students. Students can use it in their convenient times and places.
- It provides the accessibility of large amount of information which leads to effective knowledge and qualifications.
- Social communication technologies can facilitate participants' discussions with others. This may eliminate the fear of talking and increase the motivation of learners to easily explain their ideas. It also increases the communication between teachers and children as well as important others such as parents or school staff.
- It is cost effective, which means that students or teachers do not need to travel and educational organisations do not need to arrange buildings or classroom for teaching.
- E-learning has the opportunity for learning to focus on specific parts of a course they take other than all parts of this course.
- E-learning can facilitate educators' jobs and can decrease their educational stress or fears.
- It helps to deal with learners' stress by providing flexibilities which students may need to spend many times for a specific topic and this can also increase their satisfactions. Learners can arrange the use of e-learning according their needs (Arkorful and Abaidoo, 2014).
- It makes learning to be learners-centred (Holmes and Gardner, 2006).

Although these advantages of e-learning, some drawbacks and disadvantages of the use of e-learning reported by some studies. Innes et al. (2006) reported some disadvantages related to developing the materials of e-learning activities. The design can take time and can be expensive for teachers or educational organisations, and more importantly it requires technical skills to use of e-learning effectively. Most of the educators may not have these skills. In addition of these disadvantages, the use of online materials may have copyright and therefore, the use of these materials may involve careful planning or to pay extra money for the use of copyrighted materials. Innes et al. (2006) also mentioned the disadvantages of using email in learning. Using email may increase educators' workload and it may take their out of jobs' times to reply emails. In addition, educators may need to spent many times to design e-learning activities, and materials. It may increase their stress or their lack of times (Innes et al., 2006).

In addition to above disadvantages, Arkorful and Abaidoo (2014) reported the following drawbacks of using e-learning in education:

- It can decrease learners' face to face interactions and time management skills, and learners can become more alienage.
- It may be less effective than traditional learning due to lack of the use of explanations, clarifications and interpretations. The use of these in learning process increase effectivity of learning.
- With respect of increasing communication, e learning may have negative effects. Learners may not need to share their knowledge or skills with other, or they may have problem with these.
- Online testing or assessments may not be controlled entirely. Cheating can be easily used during an online test or assessment.
- Plagiarism, piracy or copy/paste method can be easily used if the learners do not have adequate writing skills.
- E-learning may not be used for all school subjects because of some subjects may need special skills. For example, practical may be needed to be conducted at laboratory in order to increase students' practical skills, but social studies may not need special skills and therefore, it is more appropriate to use e-learning for social studies than pure scientific subjects.
- The existence of many websites that may have inappropriate or unreliable content can increase the time spent on the internet in order to find the right information.

Overall, e-learning has the potential to increase the efficacy of learning. It increases student motivations, flexibilities, communications in their learning process. In regarding this study, an online educational website is used as the source of materials, activities and the tool for the intervention that planned to increase parental involvement in their children's learning. Both parents and their children are encouraged to use this website. The effect of using this website and following the weekly instructions given by teachers are investigated in this study. The benefits of e-learning mentioned above are expected to contribute both parents and their children.

### **3.3 Attitudes towards Science**

This section covers the importance and the relationships between parental involvement in their child's science learning and children's attitude towards science. In addition, the relationships between children's attitudes towards science and achievement in science.

Developed and developing countries have given high importance to increase studying science and science-related careers among students. However, the interests and aspirations towards choosing a science related careers or studying science subject have decreased recently (George, 2006; Osborne et. al., 2003). Therefore, past two decades, the focus of many research in the field of science education have turned their investigations to students' attitudes towards in order to increase choosing and studying a science related careers (Osborne et. al., 2003). The main reason of the focus on attitudes towards science is that many studies showed the relationship between attitudes towards science and academic science achievement (Rana, 2002; Papanastasiou & Zembylas, 2004; Anwer et. al 2012). In addition to academic achievement, research also demonstrated that attitudes have an effects on science interest and participation (Anwer et. al 2012). The attitudes towards science and academic achievement in science are important because these two factors affect students chooses of science related careers (Sun et. al.,2012).

Osborne et al.'s (2003) study one of the important studies regarding attitudes towards science. They defined attitudes towards science as "the feelings, beliefs and values held about an object that may be the enterprise of science, school science, the impact of science on society or scientists themselves" (p. 1053). In addition to this definition, Kind et al (2007) defined attitudes towards science as "the feelings that a person has about an object, based on their beliefs about that object" (p.2). Therefore, the definition from these studies adopted and in this study attitudes towards science are defined as the feelings, beliefs and values of children and parents about science and learning of science.

Many studies investigated the influences of children's attitudes towards science (e.g. Aschbacher et al., 2010; Bennett & Hogarth, 2009; Gilmartin et al., 2006). Many factors (e.g perception of the science teacher, value of studying science, enjoyment of science) can influence children's attitudes towards science (Raved & Assaraf, 2011). One of the most important influencing factor of children's attitudes towards science and science achievement is the influence of parents (Dewitt et al, 2013; Perera, 2014; Sun et al.,

2012). According to Boon (2012), many studies on the literature indicate that “parental views, beliefs and behaviours predict children’s career choices, academic outcomes and have influences through to college students’ science outcomes” (p. 19). Although some studies have focused on the influences of parental involvement on children’s achievement in science, limited studies investigated the influences of parental attitudes towards science on their children’s achievement or attitudes towards science (Perera, 2014).

Boon (2012) investigated parental views and attitudes of science learning, and its effects on children’s attitudes towards science. The study conducted with 132 parents via interviews and questionnaire data. It highlighted the importance of parents’ influences on children’s selection of science and science career choices and the results showed that parental attitudes and beliefs had an influence on their support of their children’s science learning. However, she did not explain any influences of parental attitudes on children’s science achievement. Perera (2014) examined the influences of parental attitudes towards science on their child’s science achievement. The data collected from an international student assessment survey from 15 countries. The finding of this study demonstrated that parents’ attitudes towards science affect their children’s science achievement. It is also recommended that parents have an active role in their children’s science achievement; therefore, schools and teachers should encourage and educate parents about the importance of science and their support in their child’s science learning. Sun et al., (2012) used the 2006 Programme for International Student Assessment data of Hong Kong secondary school’s children data to investigate the factors that affect children’s science success. The results showed that the children who have higher academic success in science are the children who are male, are from higher socioeconomic background, have higher motivation and self-efficacy and have parents who show more value and interest towards their learning.

Parents’ attitudes towards science can influence their children’s academic success in two ways (Sun et al., 2012). The first way is the influence on their child’s attitudes towards science. Children can develop similar attributes (e.g. attitudes, motivations, experiences, values) of their parents towards any academic subject within social group (Bourdieu, 1998). This includes parental attitudes towards science. Children’s self-efficacy and interest in science can be affected by their parents’ beliefs regarding science (Tenenbaum and Leaper, 2003). In addition, Dewitt et al. (2013) mentioned that the children who have high parental attitudes towards science parents have more positive educational aspirations

towards science. The more positive attitudes towards science leads more success in science (Perera, 2014).

The second influential way of parents' attitudes towards science on their children's success in science is the influence on parental involvement in their child's science learning (Sun et. al., 2012). Parents can directly or indirectly involve through supporting their child's science learning when they hold high attitudes towards science. George and Kaplan (1998) reported that higher parental attitudes towards science leads parents to communicate more with teacher and to take more actions in their child's science activities both at home or outside (e.g science museum or libraries). In addition, they can increase science resources at their home. Overall, the more positive attitudes towards science among parents will lead to more involvement and more values in their child's science learning, in turn, this improves children's attitudes towards science and academic success in science.

Dewitt et. al, (2011) described that there are very close relationships between science aspirations, parental attitudes towards science and children's attitudes towards science. The ways that improve science aspirations contribute to a positive attitude towards science and participations in science (Lyons et al., 2012). Dewitt and Archer (2015) mentions that positive experiences in science, helpful and supportive contributions of teachers and highlights of the importance of science learning increase science aspirations. Increasing science aspirations lead more interest and enjoyments of science and this also increase both children's attitudes towards science and participation in science courses.

Overall, parents' attitudes towards science can have an important contribution to increase both parental involvement in their child's science learning and their child's attitudes towards science, which in turn it leads to more success in science. Therefore, in addition to increase parental involvement, increasing parental attitudes towards science also targeted in this study. Experiencing their child's science topics, regular communications with the science teacher and highlighting the importance of their child's science learning in the intervention used in this study can help to increase both parents and their child interest and enjoyments, which in turn can lead to positive aspirations and attitudes towards science.



### **3.4 Parental Involvement in Homework**

Since parental involvement in homework activities were encouraged in this study via the intervention, this sections discusses parental involvement in homework from parental involvement in homework literature. In addition, this section ends through describing some aspects of the intervention (parents' practising online science activities with their child intervention) that used in this study.

In the literature, it is reported that homework has mixed effects on student's educational outcomes. Although many studies mentioned the benefits of the homework (e.g. Cooper et al., 2006), some studies argued that homework is not beneficial for students (e.g Blazer, 2009). Some of the highlighted benefits of homework in the literature are that homework increases the understanding of the school topics (Cooper et al., 2006), helps teachers to monitor the progress of students, decreases the time spend on topics in the class (Plato, 2000), provides after class activities for children, helps children to organize and plan their learning (Cooper et al., 2006), increase children's attitudes towards school and their learning (Blazer, 2009), and increase parental involvement and appreciation in their child's learning (Blazer, 2009: Cooper et al., 2006).

On the other hand, some studies highlighted some drawbacks of homework. Some of the drawbacks are that homework may not help teachers to follow children progress effectively, overloaded homework can lead to disinterest towards homework or the subject, struggling with homework can lead to negative attitudes towards school or the subject (Blazer, 2009), limits the time to spend for other activities (Cooper et al., 2006) and too much homework can cause a conflict between parent and children (Clemmitt, 2007). Overall, homework is beneficial for children, but it needs to be carefully planned.

Parental involvement in homework is one of the forms of parental involvement to support their children's educational outcomes at home and it is the most used form to involve parents in their children's learning (Dumont et. al., 2013). According to Nunez et. al., (2015), most parents believed that they should support their children's learning through involving in their children's homework and most of them thought that it is their responsibility. However, there are inconclusive relationships between parental involvement in homework and their children's educational outcomes. The effective results may depend on the research design, specific subjects, children's age, measured constructs (Nunez et. al., 2015). Although some studies reported negative effects of

parental involvement in homework and academic achievement (Dumont et al. 2012), many studies reported positive relationships (Patall et al., 2008; Cooper et al., 2001; Van Voorhis, 2011). Patall et al. (2008) reported from experimental studies that can provide reliable evidence that parental involvement in homework leads to more positive children's behaviour towards homework and educational outcomes. In addition, Van Voorish (2011) also supported this claim. He or she reported positive relationships between parental involvement in homework and children's academic achievement in different subjects such as math and science. On the other hand, some meta-analyses studies found that parental involvement in homework do not affect their children's achievement or performance (Hill and Tyson 2009; Jeynes 2005).

Overall, parental involvement in homework can benefit children's learning at home if the homework is carefully developed.

#### **3.4.1 Teachers Involve Parents in Schoolwork (TIPS) Interactive Homework**

"Teachers involve parents in schoolwork (TIPS) interactive homework" is one of the effective homework program that reported to have positive influences on parents and their children's academic outcomes. TIPS program is based on the findings from parental involvement and homework studies that conducted with almost each grade level children for most of the school subjects. Epstein et al., (1992) explained that parental involvement was important for students' educational outcomes, that the teachers' role can increase parental involvement and that many parents needed more help and guidance for helping their children's learning. Based on these explanations from the literature, Epstein et al. (1992) developed a homework model to help teachers to develop TIPS homework assignments. This homework model aims to improve the interactions between parents and children, the communication between parents and teachers, and children's learning. It can be used for any school subjects for every grade level.

The aim of TIPS is that teachers help parents to become involved in their children's learning activities at home by keeping them informed and involved. TIPS interactive homework can improve children's learning skills, keep parents informed regarding what their children are doing in their class and most importantly improve the three-way communications between parent, child and teacher (Van Voorish, 2003). TIPS homework assignments provide responsibilities for children to enable their parents to be involved in their learning through discussing their classwork at home. Parents are expected to

demonstrate a supportive role in their children's learning. Children share what they have learned at school with their parents and complete the TIPS activities together (Epstein and Van Voorsih 2001).

Learning objectives, instructions for children's and their parents are provided with TIPS homework assignments. The instructions are useful for children to involve their parents. These assignments are given one time in a week or two times in a month. The homework is expected to be completed in a week or ten days in order to provide enough time for parents. Special instructions for students can be added to prompt their parents' interactions and conversations during the activity. At the end, parents' feedback is requested about the activity and about working with their children. (Van Voorhis, 2001).

According to Van Voorish the principles of the TIPS program are:

- It includes "clear objectives for learning, instructions for completion, and explicit instructions for students to involve their parents (Van Voorish, 2003: 326).
- TIPS activities are regularly sent to parents once every week; or two times in each month.
- Teachers provide time for parents to complete TIPS homework with their children according to their availability.
- TIPS homework contains basic instructions for both parents and children.
- TIPS activities include materials already in existence that can be accessed easily at home.
- TIPS activities contain parent-teacher communications in order to gain feedback from parents about the activities; and about what their children are learning in school.
- Parents and student provide feedback about the effect of the activities for them and their children.
- Teachers use feedback about the TIPS activities from both parents and children to improve TIPS (Van Voorsih, 2001).

- Teachers can communicate with parents who may have had problems about the activities (Epstein and Van Voorsih, 2001).

The effects of TIPS on science, math and language investigated by several studies. With 74 sixth grade children and their parents, Balli et al. (1997) studied the effects of TIPS math on children's math achievement through a randomised experimental study. Two experimental and one control groups were used. All three groups received the same homework, but the groups differed whether they receive prompts or not. Both parents and their children received prompts in the first group, only children received prompts to involve their parents in the second group and third group did not receive any prompts. The study did not find any effect on math achievement, but it stated that the level of involvement was higher for both experimental groups that received prompts. In addition, the qualitative data showed that the quality of parental involvement increased.

Epstein et al. (1997) examined the effects of TIPS on writing and report card grades. 683 grade 6 and 8 children participated to the study. Students' progress was investigated over one year period. Parents took part in TIPS activities with their children's homework at home. The result demonstrated that children's writing scores and report card grades increased. In addition, parental involvement, teacher attitudes and homework completion improved. Although this study did not use a control group to control any effects of confounding variables, TIPS homework activities could be beneficial.

In other study about TIPS, Van Voorish (2003) investigated the effects of weekly interactive science homework on parent' homework involvement, science achievement and attitudes towards science. A quasi-experimental study with 253 middle school children and their parents conducted for 18 weeks. The experimental students completed interactive TIPS homework with their parents, but the control students only received non-interactive homework without their parents help. The study reported that TIPS science homework enhance homework completion, parents' homework involvement, science achievement and attitudes towards science.

In a further study by Van Voorish (2011), the effects of TIPS maths homework on parental involvement, student's attitudes and scores were tested. Teachers trained about how to use TIPS, and how to develop materials and activities that require both parents and their children work together at home. In addition, parents requested to keep the communication

with the teachers, and to request any needed help during the program. 153 elementary school children and their parents participated to this longitudinal (two years) quasi-experimental study. Approximately quarter of the participations received TIPS homework for two years, about half of them did not get any TIPS homework and the remaining received TIPS homework for one year. The study reported that TIPS interactive homework increased parental homework involvement. In addition, TIPS have positive effects on the attitudes towards math homework and math scores.

Overall, although all studies that involve using TIPS did not report positive effects, the evidence for the effectiveness of TIPS on parental involvement and children's educational outcomes are promising. Therefore, TIPS interactive homework principals are adopted and modified to be used in the intervention of this current study. In addition to these principles, Hollingworth et al's (2009) thin-thick strategies are used for parent-teacher communications and to inform parents about the science activities. The science activities of the 'Ttnet Vitamin' interactive learning website which broadly used and recommended by Turkish Ministry of Education utilized for parents to practise their child science related activities at home. By combining TIPS principals, Hollingworth et al's (2009) thin-thick communication strategies and Ttnet Vitamin's website activities, parental involvement in general and science learning, and children's attitudes towards science are planned to be improved. 'Ttnet Vitamin' website and practical aspects of the intervention (parents practicing online science activities with their child intervention) are explained in the next chapter under section 4.4.

### **3.5 Conclusion**

This chapter explained the use of technology for parental involvement, the role of parents' attitudes towards science in their child's science learning and attitudes towards science, and parental involvement in homework. Technology can provide communications and materials for parental involvement in their child's science learning. Experiencing science activities, communication with teachers and actively involving in their child's science learning can increase both parents' involvement and attitudes towards science which in turn, this can help children to have enjoyable science experiences and support for their learning from their parents. This can increase their achievement in both general and science learning.

## CHAPTER 4: METHODOLOGY

### 4.1 Introduction

This chapter describes the methodology and research design of this study in six sections. The first section presents the aim and research questions. The second section briefly discusses the theoretical underpinnings of the study. The third section explains the experimental research method and quasi-experimental research method adopted, explaining why this design has been chosen and the advantages and disadvantages of it. The fourth section introduces the intervention that used in this study. The fifth section covers possible issues regarding the internal and external validity of the study and how best to control these issues. The sixth and final section details possible ethical issues and the ways to minimise concerns.

The first aim of this study was to identify the extent of parental involvement in their child's general and science learning, and the relationship between level of involvement and their backgrounds. The second and main purpose of the study was to investigate whether the intervention had any effect on the components of parental involvement and parents' attitudes towards science. The research questions posed in this study were:

1. What is the extent of parental involvement in their child's general and science learning, and what are parents' attitudes towards science? To what extent do parental involvement and its components vary according to background
2. What are parents' attitudes towards science? To what extent does parents' attitudes towards science vary according to background?
3. What are the effects of the intervention (*parents practising online science activities with their child*) on parental involvement, and its components, in terms of their child's general and science learning?
  - a) What is the effect of the intervention on parental involvement in their child's general and science learning?
  - b) Does the intervention change parental roles and parents' beliefs about their involvement in their child's general and science learning?
  - c) Does parents' self-efficacy about helping their child's learning in general and in science change after the intervention?

- d) To what extent do parents' perceptions of invitations from the teachers and their child to support their child's learning in general and in science change after the intervention?
  - e) What is the effect of the intervention on parent-teacher communications?
  - f) To what extent do parents' attitudes towards science learning change after the intervention?
  - g) What is the effect of the intervention on children's attitudes towards science and their interest towards homework or studying at home?
4. What are the effects of the intervention on children's attitudes towards science and their interest in homework or studying at home?

#### **4.2. Theoretical Background to the study methods**

It is important for a researcher in the social sciences to explain the theoretical standpoint of their research. Explaining underlying standpoints provides guidance to the researcher and helps to develop a research design that can help answer research questions (Murnane and Willett, 2010). One way of developing a theoretical perspective is to consider the role of paradigms in research design. A research paradigm is a way of explaining reality, that is, the real world (Mertens, 2010). Positivism and interpretivism are the two main paradigms applied in the literature. Positivism is a paradigm that claims social reality can only be explained through scientific principles (Creswell, 2009). According to Matthews and Ross (2010), in positivist research approaches, "the knowledge of social reality is based on what can be observed and recorded rather than subjective understandings" (p:27). On the other hand, interpretivism, is a paradigm that "prioritises people's subjective interpretations and understandings of social phenomena and their own actions" (Matthews and Ross, 2010; p.28). According to the interpretivist paradigm; knowledge can be obtained from "people's interpretations and understandings" (p.28). These two dominant paradigms require researchers to employ different data collection methods; while positivism mainly uses quantitative data, interpretivism utilises qualitative data (Creswell, 2009). Although positivism and interpretivism are the two main paradigms commonly described and referred to in the literature, pragmatic approaches have also been suggested as a third paradigm (Johnson and Onwuegbuzie, 2004).

Creswell (2009) described pragmatism as a paradigm that "arises out of actions, situations, and consequences" (p.10). According to pragmatists, understanding what

works or does not is the most important determinant for deciding what research methods to select to answer research questions. Typically, researchers consider all possible data collection methods (Creswell, 2009) and pragmatism offers mixed data collection methods or approaches (Johnson et al., 2007). According to Johnson and Onwuegbuzie (2004), mixed methods approaches can be defined “as the class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (p.17). The main reason for combining methods is to provide the best opportunities to learn what works or does not when answering research questions, without drawing on a single approach or method (Lodico et al., 2010). Using both approaches in a single study can help to reduce the potentials weaknesses of a single method (as explained below in reference to the advantages and disadvantages of the experimental research design section in this study) and this increases the validity of the study (Ary et al., 2010).

Although identifying the effect of an intervention might relate more closely to positivist approaches (Cohen et al., 2007), the scale of this study and the opportunity to work with human subjects may affect the ability to answer the research questions of this current study. Therefore, to fully answer the research questions and find out what works best for the study, a pragmatic view was chosen as the underpinning philosophical standpoint for this study. The main reason for adopting this approach is that it can provide a better understanding of the research questions by demonstrating what works in terms of parental involvement. In this study, combining qualitative interview data concerning the perspectives and ideas of participants with quantitative data gathered from the questionnaires will assist in explaining the effects of the intervention. This may help to avoid potential problems affecting experimental research and enrich results.

#### **4.3. The Research Design**

Since one of the main purposes of this study is to try and establish a causal relationship between the intervention and parental and child related outcomes, a quasi-experimental approach was chosen as the most suitable research design. In this section, experimental research designs in general and then quasi-experimental research designs are explained.

According to Walliman (2006), in the real world, it is difficult to investigate a problem without examining the influence of additional confounding variables. Therefore, when



attempting to isolate a ‘problem’ for study, it is useful to understand underlying phenomenon. This can be achieved by performing an experiment or by using an experimental research design. In this kind of design, the relevant problem, or problems, are isolated and controlled separately from other confounding variables, which may also be investigated (Walliman, 2006). In order to achieve this, a special condition or experiment is undertaken to study only the relevant variable or variables while controlling for other possible confounding variables (Cohen et al., 2007). An experiment is described by Cohen et al. (2007) as a process of making changes to a variable, and then investigating the effect of this change on another variable, under specially designed conditions.

According to Fraenkel et al., (2011), an experimental research design offers an opportunity for manipulating desired variables, and is also the only research design that can help establish a causal relationship. In experimental research, independent variables (e.g. the intervention) are manipulated by the researcher, and the influences of any manipulations on dependent variables (e.g. parental involvement, parents’ attitudes towards science) can then be measured. The independent and dependent variables outlined in this study are given in Table 4.1.

Table 4.1: The independent and dependent variables for the study.

<b>Research questions:</b>	<b>Independent variables:</b>	<b>Dependent variables:</b>
What are the effects of the intervention on parents?	The intervention	Parental involvement in general learning Science involvement Parent-teacher communication Parents’ role construction beliefs Parents’ self-efficacy for helping their child’s learning. Parents’ invitations for helping their children learning. Parents’ attitudes towards science
What are the effects of the intervention on children’s outcomes?	The intervention	Children’s attitudes towards science

The purpose of experimental research is to demonstrate that independent variables only change dependent variables by controlling other factors that may influence dependent variables. For example, Balli et al. (1998) investigated the effects of a mathematics

homework intervention on parental involvement in homework and student achievement, through the use of a randomised experimental design. In their research, they utilised a mathematics homework intervention as the independent variable, with parental involvement in homework and student achievement being the dependent variables. Their experimental group received the intervention, and sought to identify the effects of the intervention on various dependent variables. They reported a positive effect from the intervention on parental involvement in homework, but no effects in terms of student achievement. According to Lodico et al. (2010), many experimental research designs in the social sciences employ a control and an experimental group. The principal reason for using two groups is to eliminate the majority of the confounding variables, which might otherwise influence the results. The second reason is to compare changes that happen across the groups following the intervention. The results when comparing the control groups can assist in demonstrating whether additional changes occurred due to the intervention. Therefore, the equivalence of experimental and control groups is important. The equivalence of groups is assured by using randomisation techniques, which involves the random allocation of participants to experimental and control groups. Any differences between the groups after the experiment can then be attributed to the intervention and not differences between the two groups (Lodico et al., 2010). This thereby reveals the efficacy or otherwise of the intervention.

Action research can also be used to investigate the effects of a specific intervention on intended outcomes. It is important to explain action research and why it is not fit to the current study. Action research defined by Carr and Kemmis (1986) as “...a form of self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own practices, their understanding of these practices, and the situations in which the practices are carried out” (p.162). It involves learning by doing or practising. Newby (2014) explained that action research is a cyclical research and progress, which should follow stages when it is conducted. It turns real life issues to a purpose. This purpose is investigated through action to reflection, and then the action or the purpose will be modified to achieve better improvement or development (Newby, 2014). Cyclical process can be useful to enhance the effectiveness of a specific intervention or program, or to explain that why some educational methods are more effective (Newby, 2014). Changes should be done during the process; therefore, this method fits best in educational settings. Specific teaching methods or effectiveness of an

educational intervention can be studied during the teaching time of teachers or practicing educators. They can improve and do changes to the ineffective elements of their methods or specific intervention in order to increase the effectiveness on the desired outcomes (Lodico 2010).

Although action research may be appropriate for the purpose of this study, it is not suitable to use in this research because it is planned that the science teacher will lead the intervention and changes are not possible for the materials of the intervention due to using an existed online materials of Ttnet Vitamin website. The researcher does not have any authorisation on the website. Therefore, two important elements of action research are not possible to be used in this study. In addition, the need of experimental and quasi-experimental research to investigate the effectiveness of parental involvement interventions in the literature is stated (See and Gorard, 2013). Overall, using a quasi-experimental method is more suitable research method than action research for this study.

#### **4.3.1. Quasi-Experimental Research**

In experimental research designs, experimental and control groups are typically formed base on random allocation. Assigning groups randomly or using randomisation can help to eliminate any confounding variables between the groups, and ensure groups are as equivalent as possible (Torgerson and Torgerson, 2008). By applying randomisation techniques, participants have an equal opportunity to be in the experimental or control groups (Fraenkel et al., 2011). In some conditions, randomisation, or the random selection of the participants to groups is not possible, as human subjects have different attitudes, beliefs and opinions regarding specific variables. In the present study, random selection was not possible because of the small number of participants and the confounding variable of parental involvement. Many factors influence parental involvement, such as time available, social, personal, and behavioural factors (Fishel and Ramirez, 2005; Hollingworth et al., 2009).

Since randomly allocating groups was not possible in this study, a quasi-experimental research design was adopted. According to Shadish et al. (2002), a quasi-experimental research design is similar to an experimental research design, except that randomisation is not used to allocate participants to groups. One of best alternative ways to allocate participants to equivalent control and experimental groups is to employ matching techniques, instead of randomisation (Bordens and Abbott, 2011).

Lodico et al. (2010) described matching as a control technique for confirming the similarities between experimental and control groups. This technique is used to reduce bias, and to ensure groups are more comparable, by eliminating any dissimilarities between them (Stuart and Rubin, 2007).

Although, as mentioned by Fraenkel et al. (2011), there are different types of experimental research design types, “the matching only pre-test – post-test control group design” type was selected as the most suitable design for this study. The reasons for choosing this design were:

5. In view of the relatively small number of participants, matching parents according to specific variables was deemed more applicable than using randomisation techniques. However, this can be a limitation in such a study, because groups may not be similar, according to the unmatched variables.
6. Differences between pre and post-intervention scores can reveal the effect of the intervention.
7. Using an appropriate control group can help eliminate confounding variables.

This type of design is shown in the following diagram:

**The matching only pre-test – post-test control group design** (Fraenkel et al., 2011)

Treatment group	M	O	X	O
Control group	M	O	C	O

M shows the groups were matched before the intervention. The O denotes for the pre and post-interventions. The X denotes the intervention group, and C the control group that did not receive the intervention (Fraenkel et al., 2011).

#### **4.3.2 Advantages and Disadvantages of Experimental and Quasi-Experimental Research Designs**

In this section, the general advantages and disadvantages of the experimental and quasi-experimental research design are explained and the benefits and limitations of the design are described in reference to the current study.

Trying to establish causal relationships using experiential observations and measurements, using control groups (Denscombe, 2007) and manipulating the desired variables (Fraenkel et al., 2011) are some of the important advantages of an experimental

research design. According to Bordens and Abbott (2011), experimental research can assist in identifying any changes that arise effecting the dependent variable, because of the independent variable. Therefore, it is ideal for establishing whether a causal relationship exists between variables. In addition, this method can help the researcher to determine the level of success of the intervention. While the quantitative data collected in this study aims to demonstrate the effect of the intervention, the qualitative data (e.g. interviews) will provide insight into why the intervention worked, or otherwise.

Experimental research designs are the preferred type of research design for showing the effect of an intervention on specific variables. Therefore, experimental research can be used to inform practice, as well as for theory testing (Marsden, 2007). According to See and Gorard (2013), if experimental research is designed carefully using a randomised controlled trial or a quasi-experiment design, including a control group, then pre and post-intervention comparisons and adequate and representative participants can provide reliable results about the outcomes it aims to measure.

On the other hand, there are some disadvantages to this kind of research design, because of the influence of bias. Bias that effects the confounding variables can have an influence on results. The possible threats to this study, and how these threats can be overcome, are explained below in section 4.4. Another limitation is that over controlling the confounding variables reduces the generalisability of the study (Bordens and Abbott, 2011). Therefore, the generalizability of this study will be limited to the participants. On the other hand, controlling the confounding variables is not possible, although using a control group could eliminate many of these problems (Bordens and Abbott, 2011).

Another limitation of the current study was the sample size (see the details in the next chapter under the sample size section). Since parents' availability of time, social, personal and behavioural factors all influenced participation in this study, the sample size was relatively small. The sample size in experimental studies is important in seeking to attain effective results, especially in a statistical analysis; however, a quasi-experimental study with a small sample size can provide useful information, due to utilisation of mixed data collection methods (Marsden, 2007). Therefore, questionnaires, semi-structured interviews, observation and feedback forms were used for data collection, to understand the impact of the intervention on the dependent variables more fully, despite the small number of participants.

For example, there are some small scale quasi-experimental studies in the literature, such as that by Marsden and Chen (2011) about learning English. They investigated the effects of two types of activities on learning—ed past tense inflections and type of knowledge promoted in English language learning. They studied four different groups of around thirty children in each group. They collected the from pre and post-interventions, conversations, a written gap-fill and picture descriptions. They did not report any effect from the intervention regarding the second group of activities, but found that the first category of activities produced benefits. In an earlier quasi-experimental conducted study by Marsden (2005), the effects of two learning techniques on French verb inflections were investigated. Two experimental groups and one control group were used in this study. Each group included about thirty students, and a number of different data collection methods were used. The effects of varied learning techniques were also then compared in relation to French verb inflections only.

According to Gorard et al. (2004), such small scale experimental studies can provide useful information about why and how an intervention succeeds or fails, and moreover, how it might be developed in the future. In conclusion, small scale quasi-experimental studies can provide sufficient understanding of an intervention by using various data collection methods to provide in-depth investigation of a process detailing whether an intervention really works or not. This study, by consulting a small number of parents, should help reveal reasons for the success or failure of interventions that try to involve parents in their child's learning.

#### **4.4 Parents' Practising Online Science Activities with Their Child Intervention**

As explained in chapter 3.4, the intervention for this study was based on the “Teachers involve parents in schoolwork (TIPS) interactive homework” program developed by Epstein et al. (1992). In addition, Hollingworth et al.'s (2009) thin-thick strategies (more details are provided in the literature review chapter) were used to facilitate parent-teacher communication, and to inform parents about the science activities. Science activities from the “Ttnet Vitamin” interactive learning website were used to involve parents with their child's science learning at home. This website includes many interactive activities and animations in any subject, for learners in any grade. The main reason for using this website for the intervention was that:

- It provides interactive activities for all school subjects;
- The Turkish Ministry of National Education recommends its use in schools; and
- The activities are aligned to the national education curriculum, which all schools in Turkey follow.

The “Ttnet Vitamin” interactive learning website was developed by the Sebit Company of Turkish Telecom. Sebit is an international e-education solution provider company based in the US, Europe and the Middle East. The aim of the company is “the empowerment of learners and educators at the K-12 level through the effective use of technology” (Sebit, 2013). The company is “developing e-education solutions by combining research-based instruction, with state-of-the-art visualisation and interaction” (Sebit, 2013).

In the intervention, parents were provided with information about how their children learn science and the science activities associated with the website, through thin-thick communication strategies. The practical advantages of the intervention, making it ideal for this study were as follows:

- Step 1: For weekly activities during the intervention period, the science teacher sent the titles of school topics and the homework for science topics that had been taught in the previous week’s lessons, with instructions and additional links to activities on the ‘Ttnet Vitamin’ website. This information was sent out to parents via email and in the form of handouts from their child.
- Step 2: Parents were asked to read the instructions for the activities at their own convenience before working with their child. They were also given one week to complete the activities with their child.
- Step 3: Parents and their children were asked to watch the animations, and then do the interactive activities together. After each animation and activity, the parent was required to follow a script to ask their child questions, such as: “What was the animation about?”, “Can you summarise it” and “Can you explain it”?
- Step 4: After watching and completing all the activities, the parent and their child worked through the relevant test questions from the website. There were five to

ten test questions for each section and parents were asked to work through only five questions together. The intention was that the child would first answer the questions, and then explain their answers to their parent. If the child did not understand the question or could not answer it, the parents were to try to help their child. However, if neither of them could understand or answer the question, they were asked to contact the teacher by email or phone for assistance.

- Step 5: After finishing all the questions, the parents then checked how many answers were correct using a reveal option on the website. If there were any wrong answers, they were asked to check the question again or to contact the teacher.
- Step 6: Parents completed the weekly feedback forms, which enabled the researcher to access their experiences of the intervention, after each week's activities. The forms were then returned to the teacher via email or in a sealed envelope.

The intervention combined three elements: weekly activity sheets that include instructions and the above steps of TIPS, 'Ttnet vitamin' science activities, and communication between parents and the science teacher. Since Ttnet Vitamin consistent with the national curriculum and include all school topics, the science topics that were teaching during the implementation of this study were followed in order to be consistent with the curriculum and support children's science learning that were taught during this time. In the time period of the intervention, three chemistry topics and two physics topics were been teaching according to annual curriculum plan. Therefore, these science topics were included in the intervention. Parents and their children worked the activities of these topics during the intervention together. However, parents may have less knowledge or feel less confident regarding some of these topics especially the chemistry topics. This may affect their involvement in their children's science learning. This was one of the limitations of this study, which was beyond the scope of it. The science topics that parents and their children followed during the intervention demonstrated in Table 4.2.



Table 4.2: The science topics of the intervention

	Main topic	Sub-topics
First week	Chemical Bonds	Chemical bonding Ionic bonds Covalent bonds Molecules of elements
Second Week	Compounds and their chemical formulae	Compounds Molecular compounds Let's investigate compounds Chemical formulae of compounds
Third Week	Mixtures	Mixtures Solutions Concentrate and dilute solutions Electrolyte and non-electrolytic solvents
Fourth Week	Absorption of Light	Absorption of light Interactions between light and matter The relationship between temperature and the distance to the source of light
Fifth week	The reflection of light	The law of reflection Incident and reflected rays in plane mirrors Reflection in smooth and rough surfaces

During the intervention, parents received weekly activity sheets that includes science topics, how to reach the activities from the website, the instructions to follow with their child and explain them what to do, how to communicate with the science teacher if they have any issue, and what they should do after the completion of the activities. Example of the first week activity sheet is given in appendix G. In addition, some pictures of Ttnet Website activities are included in appendix G.

The communication between parents and the science teacher encouraged during the intervention. Parents and science teacher requested to use email, phone calling and handouts that sent via the children in a sealed envelope. Parents weekly received the activity sheet and feedback forms via email and handouts. They requested to fill the feedback forms and sent it back via email or in a sealed envelope with their child. In addition, the teacher sent text messages to parents to inform them the email and the handouts sent to them. Parents also asked to communicate the teacher via email or phone calls if they face any problems during the activities.

#### 4.5 The expected issues for the design of this study

This section considers possible threats to the study design, and possible ways of eliminating those threats. It begins by discussing the issues affecting the internal and external validity of the study.

##### 4.5.1 Internal validity

The validity of experimental research relates to its external and internal validity. Confounding issues can influence validity, and thereby produce biased findings. Lodico et al. (2010: 241) defined internal validity as “the degree or extent to which the differences in the dependent variable are due to the experimental manipulation and not some extraneous or unwanted variables.” In other words, changes in dependent variables arise because of the independent variable, and not because of any other confounding variable, such as time or maturation. Internal validity depends on extraneous variables (e.g. maturation, history). If the research design adequately controls these variables, the validity of the study is heightened. If not, the validity may reduce (Ary et al. 2010). Using an appropriate control group should provide adequate control over confounding or extraneous variables. Possible issues that might affect the internal validity of this study, and ways of eliminating them are outlined in Table 4.3.

Table 4.3: Issues regarding internal validity (adapted from Lodico et al., 2010; p.244)

<b>Issue:</b>	<b>Definition:</b>	<b>How to overcome it:</b>
History	Parents other experiences during the intervention, which might alter the results.	Using a suitable control group.
Maturation	Maturation or personal changes among the parents which may affect the results.	Using a suitable control group.
Instrumentation	The data collection tools used in the study may lack reliability and/or validity.	Using reliable and valid tools previously tested by other researchers, and piloting the instruments.

Table 4.3 Continued:

<b>Issue:</b>	<b>Definition:</b>	<b>How to overcome it:</b>
Statistical regression	The tendency for high and low scores is changed by regression to the mean.	Using a suitable control group.
Differential selection of subjects	Use pre-existing groups, which may not be similar.	Employing matching techniques to form similar groups.
Mortality	Subjects dropping out.	Maintaining communication with both groups, eliminating pairs of dropped out parents from other groups.

In experimental research, the variables that appear in Table 4.3 can affect the internal validity of this study. Although it is impossible to precisely generate the same groups with human subjects, it was intended that both experimental and control groups should be as similar and comparable as possible. Therefore, if any variances are found to affect one of the groups due to confounding variables or changes unrelated to the independent variable, the same variances would also be expected to arise affecting the other group. This might also help to eliminate issues related to history, maturation, testing and issues such as statistical regression, as indicated in the table above.

Another important issue explored was the potential drop out of parents recruited for the study. This circumstance was difficult to plan for. It was hoped that this risk could be prevented by maintaining good communication and good relations with the parents to avoid any discontentment, but some parents were expected to drop out after (or during) the intervention. Where parental drop out occurred in the experimental group, a pair of parents from the control group was also eliminated to balance the groups.

#### **4.5.2 External validity**

Since the number of participants in the present study was relatively small, the generalisability of the study results can only be limited to those participants. However, it is important to consider the issues that affect generalisability, because they also have an influence on the results. These issues were related to the external validity and the generalisability of the study. The potential concerns regarding the external validity of the study, and the methods of controlling variables were explained in Table 4.4:

Table 4.4: Issues regarding external validity (adapted from Lodico et al., 2010; p.249)

<b>Issues:</b>	<b>Definition:</b>	<b>How to control it:</b>
Selection	Groups may not be similar enough, due to lack of randomisation; or groups may interact with each other.	Using a suitable control group formed in a similar way, parents from different schools and cities so that the interaction between the control and experimental group would be unlikely.
Treatment diffusion	Communication between experimental groups and control groups may affect the results	The experimental and control group parents were chosen from different schools and cities.
Rivalry or resentment	The control group's reaction to not receiving the intervention (Robson et al. (2001).	The groups were chosen from different geographical locations and the control group was offered the intervention on a waiting list basis.
Experimenter effects	The researcher might influence the results.	Improving the researcher's awareness when conducting the interview, decreasing direct contact between the researcher and parents, and when comparing the results with the control group being aware of assumptions made about both groups (Shadish et al., 2002).
Reactive arrangement	Subjects' attitudes and behaviours could be affected by being in the study, and participants' estimations of the expected results.	Expected outcomes were made less obvious to prevent parental estimations; and pre-interventions were designed to avoid offering clues about outcomes (Shadish et al., 2002).

The experimental and control groups were chosen from different schools in different cities to eliminate treatment diffusion and rivalry. In addition, both experimental and control group parents were not informed about being in experimental or control group, but if the intervention was found to be beneficial, the control group would have the opportunity to receive it later. To prevent any effects arising due to researcher bias, the science teacher led the intervention. This decreased face-to-face contact between the researcher and the parents, to minimise any 'researcher effect'. The researcher did not share the expected outcomes or the purpose of the intervention with parents, to avoid deceiving them about expected results.

#### **4.6 Ethical issues**

Ethical issues can arise within social research and experimental research in particular as follows. According to de Vaus (2001), ethical considerations include concerns about anonymity, confidentiality, voluntary participation and informed consent. Before conducting the research, ethical approval form was taken from the university, which it is included in appendix T. In the present study, consent forms (see Appendix F) were sent to parents to attain their permission for their child to participate in the study, and to explain confidentiality protocols. They were assured that any information they provided would remain confidential, and would only be used for this research study. In addition, the consent form included information about the study. Secondly, parents were invited to participate voluntarily in the study, extending them the right to withdraw at any time if they so wished without penalty.

Thirdly, one of the most important ethical issue in experimental research concerns the allocation of participants to experimental and control groups (Torgerson and Torgerson, 2008). It may not be ethical to provide an intervention that may be beneficial to one group while offering nothing to the control group. All experimental research faces this ethical problem. Providing the intervention as follow up or providing beneficial things to the control groups are offered in the literature to eliminate this issue (Lodico, 2010). Both of these offers will be used to minimise this ethical issue.

Prior to the research, it is unknown whether the effect of the intervention would be beneficial or not. To address this concern, it was decided that if the intervention were to prove beneficial, it would be subsequently provided to the control group. The control group might then have a greater advantage, because they would be in a position to receive an adjusted intervention eliminating any problems identified in the earlier study. In addition, before allocating the experimental and control groups, general information about the study was provided to the parents during the parent-teacher meeting. In addition to informing them about the study, information about the importance of parental involvement and the benefits of using technology was given to both groups of parents through a session. Therefore, the control group were provided with some guidelines about working with their children, including some strategies to help them do this. The guidelines were prepared according to the policies of the schools, without explaining the expected outcomes, or the purpose of the study. This helped to inform parents and to

eliminate any concerns they might have about participating to the current study. In addition, according to school staff and teachers, parents could request useful information to increase their involvement in their child's learning. Therefore, this short information leaflet could assist parents, without changing their behaviour toward the intervention.

Since rivalry or resentment issue and some other issues that lead to biased results in experimental studies, the both groups were not informed whether they are in experimental group or control group, but they informed about involving in a parental involvement study that will take up to five weeks and involve answering questionnaires and interview questions.

However, after the intervention, the implementation of the intervention was found to be very difficult; therefore, providing the intervention to the control group without the provision of the researcher would fail and not be of any benefit. Providing them a session about parental involvement in the meantime of the intervention helped control parents to get useful information about their involvement in their children's learning. In addition, after the study, the control school and teacher informed about the results of the intervention. Some recommendations about the useful elements of the intervention and parental involvement were provided to them.

#### **4.7 Conclusion**

This chapter discussed the methodology and research design employed in the study, the aim of the study, the research questions posed, and the theoretical background informing the research design. In addition, the advantages and disadvantages of the research design and possible issues influencing the internal and external validity of the study, and methods to control these issues were covered. It also introduced the intervention used in this study, before concluding by explaining the possible ethical concerns that might arise from the study and suggested ways to address them. The next chapter will explain the data collection tools and data collection process.

## CHAPTER 5: DATA COLLECTION PROCESS

This chapter contains five sections describing the process by which data was collected for the research project. Section 5.1 describes the development of the data collection instruments, while Section 5.2 covers the piloting of the questionnaires and the intervention. Section 5.3 deals with the selection of the study sample and explains the matching process for allocating parents to the experimental and control groups. Section 5.4 explains the implementation of the study and the steps that took place before and during the intervention process. The final section covers the data analysis.

### 5.1 Data collection tools

This section describes the tools that were used for data collection. The study involved two phases. The first phase was designed to learn about parents' general involvement in their child's learning and the relationship of this involvement according to their backgrounds. For this phase, the parental involvement questionnaires and open-ended questionnaires with some of the parents were used to answer the research question, as shown below in Table 5.1.

Table 5.1. Data collection instruments for Phase 1

Research question:	Tools
What is the extent of parental involvement in their children's general and science learning, and what are parents' attitudes towards science? To what extent does parental involvement vary according to background?	<ul style="list-style-type: none"><li>• Parental involvement questionnaire (see Appendix K for this questionnaire and Appendix L for an example of it completed by a parent)</li><li>• Open-Ended Questionnaire with some of the parents (See appendix R and S for this questionnaire and an example of it completed by a parent)</li></ul>

The second phase of this study examined the effect of the intervention on the variables. In order to answer the research questions and discover whether the intervention was successful, a mixed methods approach to data collection was adopted, comprising both quantitative and qualitative elements. Three different questionnaires were used and modified for the quantitative element of this study, dealing with 1) parental involvement in learning, 2) parents' attitudes towards science (see Appendix K and L for parental involvement questionnaire and example of it completed by a parent), and 3) children's

attitudes towards science (see Appendix M and N for children’s attitudes questionnaire and an example of it completed by a child), respectively. Parent weekly feedback forms (see Appendix O and P for parental involvement questionnaire and a completed example of it by a parent), semi-structured interviews (see Appendix H for all interview questions that asked to parents for pre-post interviews and interview questions for the science teacher), open-ended questionnaires (see appendix R and S for this questionnaire and a completed example of it) and observation methods were used for the qualitative element. These tools are described in this section.

For the second and main phase of the study, as described below in Table 5.2, Research Question 2 and its sub-questions were answered based on the pre-and post-intervention results of the parental involvement questionnaire subscales and the pre-and post-intervention interviews. In addition, the teacher interview, observations, and feedback forms were used to obtain more detail about the effect of the intervention and the participants’ evaluations. The third and final research question was answered based on pre and post-intervention results from the questionnaire on children’s attitudes towards science, post-interviews with the experimental parents, and the teacher interview data.

Table 5.2. Data collection instruments for Phase 2 (the intervention).

<b>Research questions:</b>	<b>Pre-intervention:</b>	<b>During the intervention:</b>	<b>Post-intervention:</b>
What are the effects of the intervention on parental involvement and its components both in their child’s general and science learning?	<ul style="list-style-type: none"> <li>• Parental involvement questionnaire.</li> <li>• Parents’ attitudes towards science questionnaire.</li> <li>• Pre/post semi-structured interviews with parents.</li> </ul>	<ul style="list-style-type: none"> <li>• Observation of child-parent work.</li> <li>• Feedback forms.</li> </ul>	<ul style="list-style-type: none"> <li>• Same as pre-intervention.</li> <li>• Post-interviews with experimental group parents.</li> <li>• Parents’ ideas about being involved in the study scale.</li> <li>• Interview with the science teacher.</li> </ul>



Table 5.2 continued:

<b>Research questions:</b>	<b>Pre-intervention:</b>	<b>During the intervention:</b>	<b>Post-intervention:</b>
What is the effect of the intervention on children's attitudes towards science and their interest towards homework or studying at home?	<ul style="list-style-type: none"> <li>• Children's attitudes towards science questionnaire.</li> </ul>	<ul style="list-style-type: none"> <li>• Observations</li> <li>• Feedback forms</li> </ul>	<ul style="list-style-type: none"> <li>• Same as pre-intervention.</li> <li>• Children's feedback about the intervention.</li> <li>• Interview with the science teacher.</li> <li>• Post-interviews with experimental group parents.</li> </ul>

### **5.1.1 Parental questionnaires**

For the main phase of the study, three questionnaires were used for the pre-and post-interventions to measure the effect of the intervention. In addition, the same questionnaires were used for Phase 1 in order to give an overall indication of parental involvement. This section explains the design and development of the questionnaires.

According to Ary et al. (2010), questionnaires can be used for assessing "attitudes, values, opinions, and other characteristics" (208) which may be difficult to assess with other tools. In both Phases 1 and 2 of this study, the purpose of using questionnaires was to gather general information about 1) parents' involvement in their children's learning, and 2) both parents' and children's attitudes towards science. Five-point Likert-type scales were used. In addition, background information about the parents was gathered in order to provide a context for analysis and assist with matching the participants into control and experimental groups.

#### **5.1.1.1 The parental involvement questionnaire**

Hoover-Dempsey and Sandler's (2005) parental involvement questionnaire was modified for use in the current study (see Appendix K). The original scale contained 12 sections, each measuring different components of parental involvement. The present study adopted five sections from the original questionnaire. The main reason for not using the other sections was that they did not fit the definition of parental involvement used in this study (see Section 2.1) and were thus not directly related to the study's context and research

questions. The following sections from Hoover-Dempsey and Sandler's (2005) parental involvement questionnaire were adopted.

- *Parents' role construction*
  - Role activity beliefs scale
  - Parents' past experience scale
- *Parents' self-efficacy*
  - Parental self-efficacy for helping the child succeed in school scale
- *Parents' perceptions of invitations from others*
  - Parents' perceptions of specific invitations for involvement from the teacher scale
  - Parents' perceptions of specific invitations for involvement from the child scale

The items on Hoover-Dempsey and Sandler's (2005) questionnaire focused on general parental involvement and were originally administered to parents of children in the fourth to sixth grades. However, while the present study was also about parental involvement, it was more specifically concerned with parents' direct support for their child's learning, and the questionnaires were administered to parents of children who were 13 years old and attending Year 7 at school. Therefore, several items from the Hoover-Dempsey and Sandler questionnaire were modified to be more suitable for this study's context, purpose, and participants. For example, the item "I believe it is my responsibility to make school better" was deleted because it did not relate to the context of the present study. Additionally, a section on "parental perceptions of personal time and energy for involvement activities" was excluded because it was not directly related to the purpose of this study.

The final, modified parental involvement questionnaire was used for both pre and post-interventions, but some changes were made for the post-intervention as some of the original items were intended only for gathering baseline information and matching (see below for more detail on matching parents to the experimental and control groups). In addition, the majority of the items in the original study were modified to support parental involvement in general and science learning (the examples can be seen under the explanation for each section below).

The parental involvement questionnaire that was used for pre-intervention contained a total of 83 items. The post-intervention questionnaires contained 77 items, but only 67 of these were used for comparison with the pre-intervention questionnaire. The first reason for this was that this concerned general parental involvement and were not expected to change after the intervention. The second reason, as mentioned above, was that several items were geared toward gathering baseline information and thus were not needed for the post-intervention. For example, the section on “parents’ own school experiences” was removed from the post-intervention because, while this section was needed for matching, it was not expected to be influenced by the intervention. Another example of an item that was removed for the post-intervention was “As a parent, I should attend special events at school”. This item was not considered relevant to the purpose of the study or expected to be influenced by the intervention. Finally, a section about the parents’ experiences of the intervention was added to the post-intervention. See Appendix A for the sections, sub-sections, and the number of items on the pre and post-intervention questionnaires. The sub-sections of Hoover-Dempsey and Sandler’s (2005) parental involvement questionnaire are explained based on the order described above.

#### ***5.1.1.1.1 Parents’ role construction scale***

The parents’ role construction items were originally developed by Hoover-Dempsey and Sandler (2005). This section contained two sub-sections: the *Role Activity Beliefs* and *Parents’ Past Experience* scales. According to Hoover-Dempsey et al.’s (2004) parental involvement model (explained in more detail in Chapter Two), role construction is an important construct for parental beliefs that have an influence on their involvement in their child’s learning. The *Role Activity Beliefs* scale was developed to measure parents’ ideas about their own responsibilities with respect to their child’s learning. The parents’ past experience scale was developed to evaluate the school experiences of parents themselves and is based on the assumption that these experiences may affect contemporary parental beliefs and behaviour toward being involved in child’s learning.

Table 5.3. Examples of parents' role construction items

Original items	Modified items	
	<i>General learning</i>	<i>Science learning</i>
I believe it is my responsibility...	As a parent, I should...	
...to communicate with my child's teacher regularly.	...communicate with my child's teacher regularly.	...ask the science teacher about my child's progress.
...support decisions made by the teacher.	...support the school's decisions about my child's learning.	...support the teacher's decisions about science education.
...explain tough assignments to my child.	...explain any homework my child finds difficult.	...help my child with their science learning at home.

#### 5.1.1.1.2 Parents' self-efficacy scale

This subscale included items from two scales developed by Hoover-Dempsey et al. (1992; 2005). The first scale was called "Parent efficacy for helping the child succeed in school", and the second was titled "Parental perceptions of personal knowledge and skills for involvement activities". The first scale (Hoover-Dempsey et al., 1992) draws on related literature regarding the relationship between the teacher and parents' self-efficacy and parental involvement. The scale measures parents' beliefs about their own efficacy in helping their children succeed at school. The second scale (Hoover-Dempsey et al., 2005) was developed based on an empirical study of parental involvement. This scale measures parents' beliefs about their personal knowledge and skills with respect to their child's learning. According to Hoover-Dempsey et al. (2005), parental self-efficacy relates to beliefs about their ability to become involved in their child's learning. It is an important aspect, which can affect their decisions about such involvement (Hoover-Dempsey et al., 2005).

Table 5.4. Examples of parental self-efficacy items

Original items	Modified items	
	<i>General learning</i>	<i>Science learning</i>
I don't know how to help my child learn.	I don't know how to support my child's learning.	I don't know how to help my child's learning in science.
I make a significant difference in my child's school performance.	I can make a significant difference in my child's school success.	I can improve my child's achievement in science.
I feel successful about my efforts to help my child learn.	I can explain some homework to my child.	I can explain science subjects to my child.

#### ***5.1.1.1.3 Parents' perceptions of invitations from others scale***

According to Hoover-Dempsey et al. (2005), parents' perceptions of invitations from others is another important aspect that may influence parental decisions to become involved in their child's learning. A parent's inclination to become involved can depend on invitations made by both teachers and the children themselves. Furthermore, parents who are asked to become involved in their child's learning may intuit that their involvement is both desired and valuable (Hoover-Dempsey et al., 2005).

Two subscales were used here: "Parents' perceptions of specific invitations for involvement from the teacher" and "Parents' perceptions of specific invitations for involvement from their child". Both scales were developed by Walker et al. (2005) to measure parents' involvement behaviours in relation to school and home activities. On the original scale, parents were asked to indicate how often teachers and children invited them to become involved in learning. In the present study, these items were modified from the original five-point scale to a three-point scale ('yes', 'no', or 'do not remember').

Table 5.5. Examples of parents' perceptions of invitations from others items

Original items	Modified items		
	<i>General learning</i>	<i>Science learning</i>	
My child's teacher asked me...	Has any one of your child's teachers...	My child's science teacher...	Invitation from Teacher
...or expected me to help my child with homework?	.... asked you to help your child with their homework?	...wanted me to support my child's science homework.	
...to talk with my child about the school day?	.... asked you to talk with your child about their school day?	...informed me about what my child is learning in science.	
My child asked me to help explain something about his or her homework.	My child asked me to explain something about their homework.	My child has asked me to help them with their science homework.	Invitation from Child
My child talked with me about the school day.	My child explained to me what they are learning in their lessons.	My child has told me what they are learning in science.	

#### 5.1.1.2 Parents' attitudes towards science questionnaire

A complete scale that measured parents' attitudes towards science learning was not found in the literature. Therefore, a relevant questionnaire was developed based on the following studies, which examined parents' attitudes regarding science: Smith et al. (2012), Pardo and Calvo (2002), Boon (2012), and Wainwright (2011). Although access to the "Parents' attitudes towards science" scale developed by Chen (2001) was not established, the themes used in this scale were adopted. The questionnaire was developed based on two themes proposed by Chen (2001): "parents' own ideas towards science" and "parents' ideas and expectations of their child's science learning". Thus, a questionnaire that measured "parents' own attitudes towards science" and "their ideas and expectations about their child's science learning" was considered more relevant to the context of the current study. These were the two themes used to develop the questionnaire, and the various items related to these themes were taken from the following studies:

- Parents' own attitudes towards science scale:
  - The importance placed on science by Pardo and Calvo (2002).
  - Smith et al.'s (2012) interest in science and self-efficacy in science.
- Parents' ideas about their child's science learning scale.

- Wainwright's (2011) attitudes and beliefs among parents regarding maths education.
- Boon's (2012) views of math and science education.

The *Parents' attitudes towards science scale* contained two sub-scales: parents' own ideas about science and parents' ideas and expectations for their child's science education. The first subscale included three components: the importance of science, interest in science, and self-efficacy in science. The second subscale included the following components: parents' perception of their child's interest in science, science efficacy, and scientific careers. The main *Parents' attitudes towards science* questionnaire included a total of 18 items, with nine items for each sub-scale (see Appendix K). Half of these items measured the parents' own attitudes towards science, and the other half measured the parents' ideas about their child's science learning.

Table 5.6. Examples of parents' attitudes towards science items

<b>Parental attitudes towards science</b>	<b>Parents' ideas about their child's science learning</b>
I believe that science is useful in everyday life.	My child enjoys discussing scientific topics.
I do not have much interest in science.	My child is good at science.
I like to watch TV programmes about science (e.g. documentaries).	My child will need to use science in their future job.

This section has explained the parental involvement and parents' attitudes towards science questionnaires and their components. The next section explains the questionnaire used to measure the children's attitudes towards science.

### 5.1.2 Children's attitudes towards science questionnaire

The children's attitudes towards science questionnaire was adapted from the following surveys: Kind et al.'s (2007) "attitudes towards science questionnaire", Shah and Mahmoud's (2011) "student attitudes towards science learning scale", and Owen et. al.'s (2008) "The Simpson–Troost attitude questionnaire". Kind et al.'s (2007) questionnaire covers themes such as learning science in school, self-concept in science, science outside of school, future participation in science and the importance of science subscales. Shah and Mahmoud's (2011) interest in science learning subscale and Owen et. al.'s (2008) family models subscale were used to measure children's attitudes towards science in

general. The questionnaire contained a total of 35 items, and the same questionnaire was used both pre and post-intervention. The subscales and examples of the items used are presented in Table 5.7 below.

Table 5.7. Subscales and examples of items from the children's attitudes towards science questionnaire

<b>Children's attitudes towards science questionnaire</b>		
<b>Sections</b>	<b>Number of items</b>	<b>Examples of the items</b>
Interest in science learning	7	I can explain science topics in my own words
Learning science in school	6	We learn interesting things in science lessons
Self-concept in science	6	I find science difficult
Science outside of school	5	I would like to join a science club
Future participation in science	3	I would like to study science at university
Importance of science	4	Science makes our lives easier and more comfortable
Family models	4	I think my father likes science

This questionnaire was used for both Phases 1 and 2 of the study. Children's general attitudes towards science and how this relates to certain background information was investigated in the first phase. In the second phase, this questionnaire was used both pre and post-intervention.

### 5.1.3 Semi-structured interviews

The previous sections explained the questionnaires used in this study. This section will discuss the semi-structured interviews, which comprised one of the qualitative data collection instruments used. These interviews took place only in the second phase of the study, and their purpose was to provide a better understanding of the effectiveness of the intervention. It was hoped that the interviews would provide an in-depth understanding of why the intervention worked or failed to work, which would not have been captured through questionnaires alone.

Both the experimental and control group parents were asked nine semi-structured interview questions prior to the intervention in order to gather baseline information,



support the matching procedure, and provide additional information for comparison after the intervention. These questions were related to those asked on the questionnaire. In addition, the experimental school parents were asked eight questions in the post interviews in order to understand their experience of the intervention. The interview questions are presented in Appendix H, and the themes used for analysis of the interview data are presented in more detail in the first section of Chapter Seven. In addition, the science teachers were also interviewed with 11 semi-structured questions. (see Appendix H for these questions).

### 5.1.3.1 Other documents

A number of additional data collection tools were used to gather information about parental involvement and the participants' experiences of the intervention. This was supplemented by evaluative data from the intervention activities. For example, weekly feedback forms from parents and an open-ended questionnaire submitted to the children were used to learn about their experiences and process evaluations of the intervention. Open-ended questions were also used with parents who did not participate in the intervention to learn about their general involvement in their child's learning in order to provide data for both phases of this study. In addition, observations were also used to evaluate the process of the intervention and the study.

## 5.2 The pilot study

This section will explain the process of piloting the questionnaires, the intervention, and the interview questions.

Table 5.8: The piloted data collection tools regarding their use in each phase of the study

Phase One	Phase Two
Parental Involvement Questionnaire (The pilot conducted with six Year 7 parents from an after-school centre)	
Children's Attitudes Towards Science Questionnaire (Six Year 7 children from an after-school centre participated in the pilot)	
Open Ended Questionnaire with parents and children (Three parents from the same centre participated in the pilot)	Intervention (Three Year 7 parents from an after-school centre participated)

Table 5.8 Continued:

Phase One	Phase Two
Semi Structured Interviews (Three Year 7 parents from a private school participated)	
	Weekly Feedback Forms (Piloted with the same parents who participated the pilot of the intervention)

Table 5.8 demonstrated the piloted data collection tools. Same parental involvement parental attitudes towards science and children's attitudes towards science questionnaires were used for both phases. Therefore, they piloted with parents and their children who were from an after-school centre, and who did not participate in the actual study. On the other hand, the intervention, semi structured interview questions and the weekly feedback form used for stage two. The intervention and the weekly feedback form were piloted with the same parents who attended the pilot of the questionnaires, but three private school parents, who were not included in the actual study, participated in the pilot of the interview questions before the implementation of the intervention. Some of the useful data from the interviews were also used to support the stage one's data.

### 5.2.1 Piloting the questionnaires

The questionnaires were first designed in English and translated into Turkish by the researcher. They were then back-translated into English by three PhD students and one academic who had a very good understanding of both Turkish and English. The reason for undertaking a back translation was to discover any differences between the original and the translated items. The reverse translation occurred prior to the pilot. The back-translated questionnaires were compared with the main questionnaires by the researcher, and necessary corrections were made to the Turkish copies of the questionnaires. No particular terms proved especially difficult to translate.

The parental involvement questionnaire and the children's attitude towards science questionnaire were piloted two months before the actual study with six parents and their children. The pilot took place at an after-school education centre in one Turkish city. The pilot study participants lived in a different location to the main study participants, and this was the only stage of the research in which they took part. In addition, the pilot

participants were from a lower socio-economic background than the actual study parents, and were chosen because of the researcher's ease of access to them. The purpose of the pilot study was to determine how long the questionnaires took to complete, to discover any potential issues with the items or possible misunderstandings, and to identify any grammatical problems or issues with the organisation of the sections. Therefore, oral feedback from parents and their children was sought. The outcome of the pilot study is explained below.

#### **5.2.1.1 Parental involvement questionnaire**

Parents were telephoned by the principal of the after school education centre to inform them about the study and invite them to participate in the pilot. These parents were chosen by the Principal. They were then invited to come to the centre for a meeting with the researcher at a time convenient for them. At this meeting, a consent letter and the questionnaire were given to the parents, and they were asked to read the consent letter and complete the questionnaire with the researcher. In addition, they were asked to provide oral feedback to the researcher while they were answering the questionnaire. The following observations about the administration of the questionnaire were noted:

1. The parental involvement questionnaire took about 20-25 minutes to complete.
2. Some parents found the introduction part of the questionnaire confusing. This was then re-drafted to provide a clearer explanation. In addition, some items confused parents, and these were deleted from the main questionnaires. For example, the item "I felt I was excluded at school" was deleted because it was confusing. In addition, the item "I like to read about scientific topics" was changed to "I like to read about some scientific topics".
3. Some parents asked for explanations of certain words, such as the term "academic performance" in the item "I can make a significant difference in my child's academic performance". This item was thus changed to "I can make a significant difference to my child's school success". These words were changed to be more easily understandable by the parents. In addition, some grammatical corrections were suggested.

#### **5.2.1.2 Children's attitudes towards science questionnaire**

Six children from the after-school education centre took part in the pilot of the children's attitudes towards science questionnaire. These children were all in the same grade (Year 7) and of the same age (13 years old) as the children in the main study. A consent letter was given to the parents of these children and was signed before they started to complete the questionnaire. Four of the children completed the questionnaire as a group, and the others completed the questionnaire individually. The students were asked to provide oral feedback to the researcher while they were answering the questionnaire. The following observations were noted:

1. The completion of the questionnaire took about 10-15 minutes.
  2. Some children found the introduction to the questionnaire confusing. Therefore, the necessary explanation was added.
  3. Some children asked for clarification of certain items, such as what was meant by 'science-related jobs' in the item "I would like to have a science-related job". This item was thus changed to "I would like to have a science-related job (e.g. doctor, nurse, engineer)".
  4. Almost every child asked what was meant by the "harmful effects of science" question. Therefore, the item "The benefits of science are greater than any harmful effects" was deleted from both the children's and parent's questionnaires.
- In addition, some grammatical errors were found and corrected.

#### **5.2.2 Piloting the intervention**

Only three parents who completed the pilot of the questionnaire also participated in the intervention because the other parents either did not have access to the internet at their homes, did not know how to use the internet, or did not have an email address, all of which were criteria for participation in the actual study. In the pilot, the nature of the intervention was explained to each parent individually. Then, one week's worth of activities was sent to two of the parents via email, while the third parent came to the after school centre for the intervention because they did not have an internet connection at home. Home visits were made to the other parents in order to observe them while they were completing the intervention activities. The main purpose of piloting the intervention was to determine:

- Whether the intervention and the activities made sense to the parents and their children.
- How long the activities and the intervention took.
- What problems the parents and children would be likely to encounter during the intervention, such as use of the internet, use of the website, and completion of the homework.
- The practicality of the intervention.

The following observations were made about the intervention pilot:

1. The activities and instructions were sent via email in a Word document. The parents prepared the activities before working with their children in order to become familiar with them.
2. Certain issues were encountered with downloading the Word documents sent via email. Therefore, it was determined that it would be preferable to put all the text into a concise email. In addition, it was decided that a worksheet providing instructions about the activities would be easier to follow.
3. The parents followed the instructions easily.
4. In the instructions, it was explained that the parents were expected to ask their children two questions after each activity: “What is the animation about?” and “Can you summarise it?” However, it was found that the children sometimes struggled to answer these questions. The researcher thus interfered by providing key words to assist with the children’s explanations.
5. It would be better for the children to take notes when doing the activities.
6. After watching the videos from the “Ttnet Vitamin” website, the children completed a test on the topics presented. The parents and children attempted to solve the questions individually, and when the children had completed their answers, they explained their reasoning to their parents. Completing a whole test took a lot of time. Therefore, the parents and children were asked to complete only five of the questions together.
7. Following the reduction to five questions, completing all of the activities and the test took about 35-40 minutes. The parents felt this time to be suitable.

### **5.2.3 Piloting the interview questions**

The interview questions were piloted with three parents who did not participate in the main study but who had completed the general parental involvement questionnaire. The

pilot interviews were conducted one week prior to the main interviews. The main reasons for piloting the interview schedule were to determine how long each interview would take and to eliminate any issues or misunderstandings related to the questions. The observations from the interview pilot were as follows:

1. Each interview took about 15-25 minutes.
2. An introductory question about the child's current situation and their interest in their homework was added.
3. Some of the questions were expanded. For example, "Has your child asked you for any help or explained to you anything related their learning?" was expanded to "Has your child asked you for any help with their homework or explained to you what they are learning in school? If yes, can you tell me more; if no, can you tell me why?" The main purpose of this change was to elicit more specific information about parental help with the children's learning and homework.

### **5.3 Reliability analysis of the questionnaires used in this study**

An analysis of the reliability of these questionnaires is provided in this section. Reliability is important for determining the effectiveness of instruments of measurement and is the extent to which an instrument provides consistent or stable results on repeated administrations (Jackson, 2011). In other words, an instrument should provide similar results each time it is repeated under the same conditions (Cohen et al., 2007). The reliability of a questionnaire can be measured using internal consistency (Mertens, 2010), which refers to "consistency within the instrument" and demonstrates "whether the measure is consistently measuring the same trait or ability across all items on the test" (Lodico et al., 2010: 96). In other words, internal consistency is the correlation of the items with each other and with the test itself (Tavakol and Dennick, 2011). Cronbach's alpha reliability coefficient is a method to calculate and address the internal consistency of a scale that has multiple items (Shelby, 2011). Cronbach's alpha takes values from 0 to 1, and a value of 0.7 or greater is usually considered to indicate reliability (Field, 2005; Pallant, 2007).

Three questionnaires were used in this study: parental involvement, parents' attitude towards science, and children's attitude towards science. Since it is important to report the internal consistency of the questionnaire items used in this study, Cronbach's alpha

reliability coefficients were calculated and reported for each subsection and the questionnaire as a whole. The data collected from the main participants were used for these calculations. Since these questionnaires were adapted from existing questionnaires, a factor analysis for the items and the scales was not calculated. The Cronbach's alpha coefficients for each subsection and the total questionnaire are presented below in Table 5.9.

The Cronbach's alpha values for general efficacy, internet skills, and parents' attitudes towards science, general involvement, science involvement, and children's attitude towards science, were 0.8 and greater. This indicates that these subsections were internally consistent and reliable. The Cronbach's alpha values for role construction, science role construction, science efficacy, and science innovation, were between 0.7 and 0.8. This demonstrates that the internal consistency of these subscales was acceptable.

Table 5.9. The Cronbach's Alpha coefficients of the questionnaires and subsections

		<b>Cronbach's Alpha</b>	<b>N of Items</b>
<b>Parental Involvement Questionnaire</b>	<b>Parents' general involvement</b>	0.84	36
	<b>Parents role construction beliefs in general learning</b>	0.80	8
	<b>Parents' self-efficacy in general learning</b>	0.80	9
	<b>Parents' perceptions for invitations for general learning</b>	0.77	13
	<b>Parents' science involvement</b>	0.81	20
	<b>Parents' role construction beliefs in science learning</b>	0.70	4
	<b>Parents' self- efficacy in science learning</b>	0.79	8
	<b>Parents' perceptions of invitations for science learning</b>	0.72	7
<b>Parents' attitudes towards science</b>		0.84	18
<b>Children's attitudes towards science</b>		0.93	34

## **5.4 The participants and sample size**

This section describes the background of the participants, the matching of the groups, and the sample size. First of all, the reasons for selecting private schools and parents of children who attend these schools are discussed. Then, the total sample size for the general parental involvement results and for the effect size results are described. Finally, the matching process for the groups is explained in detail.

### **5.4.1 Background of the participants and schools**

Year 7 students (13 years old) and their parents were chosen from two private schools in two different cities in Turkey as the participants in this study. These two private schools were chosen for the following reasons:

- The researcher's access to these schools was unproblematic due to previously-established relationships with the school administrators, especially the schools' vice principals.
- According to the vice principals, the family backgrounds of students from the two schools were similar, especially in terms of their socioeconomic status and level of education. In Turkey, parents from higher socioeconomic backgrounds generally send their children to private school (MEB, 2013), and most of the parents from these two schools had completed a higher level of education. It was thought that this would ease the implementation of the intervention.
- Most of the participating parents and children had computer and internet access in their homes. This information was confirmed during Phase 1 of the study (see Appendix I). It can be seen in the table in Appendix I that 85% of the parents had access to a computer, and 74% had an internet connection at home. Most of the parents who had an internet connection at home (89%) restricted internet access for their children. In addition, it was assumed that parents had a computer and an internet connection at their home prior to the study, because this is the case with the majority of families whose children attend private schools. Since the intervention involved the use of a computer and the internet, the selection of the control and experimental groups parents from the private school parents facilitated the study because most of these parents had a computer (98%) and an internet connection (87%) at home, compared to the public school parents, of



whom 74% had a computer and only 61% had an internet connection. The percentages of public school parents having a computer and an internet connection at home were similar to the general population of the Turkish families. According to the Turkish Statistical Institute (Turkstat), in 2014, 79% of Turkish families had a computer at home, and 60.2% of households had internet access (Turkstat, 2014).

- Except for public schools where education is free, parents in Turkey pay a large amount of money each year (approximately 12,000 Turkish lira or £3,500 per year) for their children to attend private schools. About 9% of the schools in Turkey are private schools (MEB, 2013).

Two different private schools from different cities were chosen to prevent “treatment diffusion” bias, which was explained in Section 4.5. The schools were about 200 km apart, and this limited the chances of the parents knowing each other. After inviting the schools to participate, the experimental and control schools were determined based on the numbers of Year 7 children in each school and the established relationships with the school administrators. The main reason for choosing the experimental and the control schools according the population of children was that this facilitated the matching from the smaller school to the larger school. See Section 5.4.2.1 below for more detail on the matching process.

#### **5.4.2 Sample Size**

Different participants participated in each of the two phases of this study, and therefore, two different sets of data were collected. As explained earlier in this chapter, the first set of data (Phase 1), collected from the general parental involvement questionnaires from both private and public school parents, was used to answer the first research question on the involvement of Turkish parents and the relationship of parental involvement with their backgrounds. The second data set (Phase 2/intervention) was used for the pre and post-interventions and matching. In the following subsection, the participants and their backgrounds are discussed.

#### 5.4.2.1 Demographic descriptions of the Phase 1 participants

Approximately 350 parental involvement questionnaires were sent to parents whose children were educated either in a private or a public school. The questionnaires were sent home from school with the children in sealed envelopes, and it was requested that the questionnaires also be returned in sealed envelopes. Table 5.9 below presents the demographic information of the parents who completed the general parental involvement questionnaire. Two hundred and two questionnaires were completed and returned, representing a response rate of 58%. This response rate was low. 47% of these respondents educated their child in private schools. It was primarily the mothers who completed the questionnaires; 72% of the respondents were female. On the other hand, the children's gender showed greater variation, with 55% parents of girls and 44.7% parents of boys. This could be because girls' parents had a greater interest than the boys' parents in completing the questionnaire. Finally, the majority of the parents (84%) did not have science-related jobs.

Table 5.10. Parents' demographics

		<b>N</b>	<b>Percent (%)</b>
<b>Gender</b>	Male	56	28
	Female	146	72
<b>Science related jobs</b>	Yes	55	16
	No	146	84
<b>Child's gender</b>	Boy	89	45
	Girl	110	55
<b>School Group</b>	Private	95	47
	Public	107	53
<b>Family Education</b>	Lower	99	49
	Medium	43	21
	Higher	59	29
<b>Total</b>		<b>202</b>	

The parents were also asked to indicate their own level of education and the education level of their partners. These were categorised as lower, middle, and higher. Parents who had completed only primary or a lower secondary education were categorised as belonging to the lower level group. Parents who had completed an upper secondary

degree were categorised at the medium level, and parents who had completed an undergraduate or postgraduate degree were categorised at the higher level. For each family, the highest level of education (of either the mother or father) was used to indicate the family's education level. Almost half of the parents had a lower education level (49%), while 21% of them had a medium level, and 29% had higher level education backgrounds.

#### **5.4.2.2 Demographic descriptions of the intervention (Phase 2) participants**

In total, 190 parental involvement questionnaires and consent letters were sent to parents of children who attended the two private schools. Again, the questionnaires were sent home from school with the children in sealed envelopes, and it was requested that the questionnaires also be returned in sealed envelopes. Eighty-nine parents returned completed questionnaires. Thirty-one of these were from the experimental school, and 58 were from the control school, yielding a response rate of 48% for both schools. In order to improve the response rate, the researcher requested that the teacher remind the children frequently to have their parents complete and return the questionnaires. This increased the response rate slightly. Table 5.11 below presents the response rates for each school.

Table 5.11. Response rate for parents' pre-intervention questionnaires

	<b>Sent Questionnaires</b>	<b>Returned Questionnaires</b>	<b>Response rate</b>
<b>Experimental School</b>	65	31	48%
<b>Control School</b>	125	58	46%
<b>Total</b>	190	89	47%

In total, 47% of the parents responded to the questionnaire. The demographics of the parents who responded to the survey are shown below in Table 5.12.

Most of the parents who responded were female (62%). More than half had an undergraduate (44%) or higher (10%) level of education, and about a quarter of them had been educated to the upper secondary level (24%). In total, almost 80% of the parents had an upper secondary or higher level of education. Within this group, there were similar proportions of boys and girls.

Table 5.12. Parental demographics in terms of gender, level of education, and gender of their child

		<b>Experimental (N = 31)</b>	<b>Control (N = 58)</b>	<b>Total (N = 89)</b>
		%	%	%
<b>Gender</b>	Male	39	38	38
	Female	61	62	62
<b>Highest Level of Education</b>	Postgraduate	10	10	10
	Undergraduate	55	37	44
	Upper secondary	13	29	24
	Lower secondary	10	9	9
	Primary	10	14	12
	Other	3	0	1
<b>Child's gender</b>	Male	55	46	48
	Female	45	54	49

#### 5.4.2.1 Matching parents to the experimental and control groups

This section explains how the experimental and control groups were formed. The experimental school parents (N = 31) were matched with the control school parents (N = 58) according to their involvement levels, gender, and level of education. Parents were matched according to their levels of involvement, level of education, and gender prior to the intervention in order to prevent any unwanted bias and eliminate dissimilarities between the experimental and control groups. The experimental and control groups were determined according to these three factors in order for the groups to be as similar and comparable as possible. For example, parents' level of education could have an influence on their involvement in their child's learning because more highly-educated parents might have greater confidence in being involved than less well-educated parents (Hill et al., 2004), and this may affect the results if it is not controlled for.

The matching technique for the intervention phase of the study proceeded as follows: First, general parental involvement levels were measured from the general role construction, general efficacy, invitations, and communication sections of the parental involvement questionnaire. A score was calculated for each parent from the sum of the scores from these sections. Each parent was then allocated to one of four involvement levels according to this score. These four levels correspond to the quartiles of the mean scores of the experimental and control groups (N = 89). For example, Parent 2 (the number is a code for an experimental parent) was male, had completed a postgraduate degree, and had a parental involvement mean score of 80.7. This score put this parent in Level 2 of the general involvement category. A potential match was sought in the control

group, and Parent 2 was thus matched with Parent C54 (C and the number together indicate a control parent), who was also male, had completed a postgraduate degree, and had a mean parental involvement score of 82.9, which also put him in Level 2 of that category.

Table 5.13. The involvement level of parents according the mean and the quartile scores

<b>Mean = 78.4</b>		
<b>Percentiles</b>	0	Level 4 < 74.6
	25	Level 3 > 74.6
	50	Level 2 > 79.3
	75	Level 1 > 83.2

The experimental school parents (N = 31) were each matched with a control school parent (N = 58) according their involvement levels, gender, and level of education. First, five experimental group parents who did not have internet or a computer at home were eliminated. Second, one parent from the experimental school was eliminated because they had not completed any level of formal education. Thus, 25 experimental group parents were matched with control school parents. However, three parents declined to participate after learning about the intervention in more detail, and four more dropped out after the intervention had started. The scores, involvement levels, level of education, and gender of the matched parents who participated in the intervention (N = 18) are shown in Table 5.14 below.

Table 5.14. The mean scores of their involvement and the involvement levels, level of education, and gender of the matched parents

Experimental Parents			General involvement score (%)	Control parents			General involvement score (%)
	Gender*	Education*		Match	Gender	Education	
2	2	6	81	C54	2	6	83
3	2	4	76	C11	2	4	78
5	2	5	86	C45	2	5	84
7	1	5	80	C17	1	5	82
8	1	4	77	C33	1	4	76
10	2	5	74	C40	2	5	74
11	2	5	73	C32	2	5	70
14	1	5	85	C5	1	5	88
15	1	2	71	C42	1	2	63
16	2	3	79	C39	2	3	82
17	2	5	85	C46	2	5	85
19	2	3	75	C8	2	3	77
21	2	5	79	C20	2	5	81
22	2	6	76	C14	2	5	76
24	2	5	83	C53	2	5	82
25	2	5	80	C12	2	5	79
27	1	5	79	C58	1	5	81
28	2	4	73	C23	2	4	68
N=18 5 males and 13 females		The Mean	78.5	N=18		The Mean	78.3

\*For gender, 1 represents fathers and 2 represents mothers. For education level, 2 = primary, 3 = lower secondary, 4 = upper secondary, 5 = undergraduate, and 6 = postgraduate level.

The mean of the parental involvement score of the matched experimental parents (78.5%) was almost identical to that of the matched control parents (78.3%). It can thus be seen that both groups' parental involvement scores were similar.

## 5.5 Implementation of the intervention (Phase 2)

This section is divided to two subsections which explain the stages that took place before and during the implementation of the intervention. The first subsection is split into five stages which correspond to the timeline of this study (see Appendix B).

### **5.5.1 Stages that took place before the intervention**

#### **Stage 1: Meeting with the schools and teachers before the study**

In order to recruit schools for this study, the researcher visited four private schools in the southern region of Turkey. The main reason for visiting more than two schools was to guarantee that at least two schools would participate. From these schools, the researcher met with five science teachers, three principals, and four deputy principals to explain the aims of the study and the schools' potential involvement in the research process. The purpose of these meetings was manifold:

- to explain the study in more detail and gather feedback.
- to find out what materials were used in class in order to design the materials for the intervention.
- to learn about their lesson plans.
- to find out about current relationships with parents.

After these meetings, the following observations were made:

1. In all of these schools, parents were informed weekly about their children's progress, behaviour, and exam results. Parent-teacher-child meetings were organised at the beginning of each term. Teachers were also expected to visit all parents at their homes once a term. Parents had contact information for the teachers and the school. They sometimes contacted the school and teachers, usually by phone or a school visit.
2. One of the schools' vice principals said that "recruiting the parents to the study would be an important issue. They may not want to participate or they may give up later".
3. Each teacher followed the Turkish National Curriculum, but their weekly lesson plans may be slightly different.
4. All the schools suggested that many parents may not use the internet or even have an internet connection at home due to possible misuse. This issue was explained in more detail in Chapter Four.
5. Both schools used the nationally-prescribed textbooks, which are designed and distributed by the Ministry of National Education to all Turkish school children. In addition, the schools used similar support materials to better prepare their

students for the national examinations. This use of similar materials and curriculum was important to reduce any dissimilarities between the schools.

## **Stage 2: Invitations to the schools and science teachers**

Four schools were asked to participate in the study. One of these schools declined to participate, while the other three accepted. The invitations were made before the pilot study. Two of the three schools were selected to be the control and experimental schools, and the third school was put on a reserve list in case any problems occurred regarding the other schools. After the schools were invited to participate, the science teachers were also invited individually. One of the schools had two male science teachers for the targeted year group. One of these teachers taught Year 5 and Year 6 children, and the other taught the Year 7 and Year 8 children. In the other school, four science teachers taught the Year 6 and Year 7 children. Two of them were female and taught Year 6 children while two male teachers taught Year 7. Since it was originally planned to undertake the study with Year 6 students (12 years old) and their parents, these teachers were originally invited to participate. Although the teacher in the first school agreed to participate, the female Year 6 science teachers at the second school did not wish to take part. The reason for this was that they did not wish to work collaboratively with a male researcher. The vice principal of this school thus suggested that the study focus instead on Year 7 children. Therefore, the target year group was changed to Year 7 in both schools, and all teachers agreed to participate in the study.

## **Stage 3: Inviting parents and the completion of the parental involvement questionnaire**

Parents were invited to participate in the study and asked to provide informed consent (see Appendix F). The parental involvement questionnaire that was used for Phase 1, the pre-intervention, and matching were placed in an envelope along with the consent letter and given to the Year 7 children, who were asked to take the envelope home and give it to their parents. Due to the researcher's time limitations, this invitation occurred in the last week of the first term of the school year. It was thought that a one-week period would be long enough for the questionnaire turnaround, but because it coincided with the last week of the term, some of the students were absent, and some of them attended a special programme offered by both schools to their students. The purpose of this programme was



to complete extra studies and prepare for the national exams, and it required that the students stay at specially arranged places with their teachers for one week. Therefore, some of the questionnaires were returned after the first term break, which led to a slight delay in beginning the intervention. This may also have decreased the questionnaire response rate, which was 47%. Overall, sending and receiving back the questionnaires took about one month.

#### **Stage 4: Matching and interviewing parents**

After matching parents to the groups as discussed earlier, the researcher spoke to the vice principals of both schools to determine the best way to conduct the interviews. The purpose of the interviews was to gather more detailed information about parental involvement in their child's learning as well as about their relationships with their children and the teacher. Both experimental and control group parents were interviewed. It was determined that the best way to contact the parents about the interview was by telephone. The schools provided the parents' phone numbers, and both schools believed that all parents would be happy to be contacted regarding their child's learning as this was a common practice in the schools. The parents were firstly contacted by phone. During this call, the researcher introduced himself and invited the parents to take part in the interview. Then, convenient interview times were arranged with the parents who wanted to participate, often in the evening after work. The interview process took about one week for the experimental school parents and was completed just before the start of the intervention. An additional week was needed to interview the control group parents, and this took place during the first week of the intervention. Thirteen experimental parents and 11 control parents were interviewed. The reason for interviewing only these parents was that the others were not available to be interviewed. Instead, these parents completed open-ended questionnaires, with questions similar to those asked in the interviews. Each interview took about 15-30 minutes. All parents were contacted by telephone and were also invited to meet face-to-face with the researcher at the upcoming annual parent-teacher meeting.

#### **Stage 5: Meeting with the experimental and control group parents**

After the interviews and just before the intervention began, the researcher met with the matched experimental group parents. The purpose of this meeting was to explain the

intervention and to provide general information about parental involvement and the usefulness of the internet for supporting their child's learning. The researcher met with each parent (mother, father, or sometimes both) at school during the annual parent-teacher meeting. First, brief information about the importance of parental involvement in general and in science, in particular, were shared. Recommendations about what parents can do at home to support their child's learning and the educational value of the internet were provided to parents individually. Next, the intervention and parents' roles in delivering the intervention were explained. Finally, the first week's activities sheet, parent feedback form, and instruction form for the intervention were given to each parent in an envelope. In addition, parents' emails were taken in order to send these documents electronically. Some parents from the experimental group (eight in total) did not participate in the parent-teacher meeting. Instead, these parents were telephoned, and the information briefing and intervention were explained. The first week's documents were sent home in an envelope with their children. Three parents did not wish to participate in the study after this meeting.

One week later, the control school parents were invited to meet with the researcher at the annual parent-teacher meeting (note that both schools held a parent-teacher meeting at the beginning of each school term). The control school's parent-teacher meeting took place two weeks after the experimental school's meeting. Again, the researcher met with the control parents individually during this meeting at the school. The same information provided to the experimental parents was shared with the control parents, minus the information about the intervention. The main reason for giving this short introduction to both the experimental and control groups was to provide them with beneficial information about their child's learning without directing their behaviour, according the purposes of the study. Therefore, the control parents received beneficial information about their child's learning and the use of the internet.

### **5.5.2 Implementation of the Intervention**

All students needed to be registered with the "Ttnet Vitamin" website used in the intervention in order to access the activities. However, this registration was not free. The researcher thus contacted the customer service department of the "Ttnet Vitamin" website in order to arrange free membership for all participating students. In return, the developers of the website requested access to the details of the current study and its results

in order to help them improve their website. This was agreed, and the developers offered three months of free access to all participating students.

The intervention began after the school meeting with the experimental parents. The first week's activities sheet and feedback form were given to the parents at this meeting. At the beginning of each subsequent week, the activities sheets and feedback forms were sent home with the children in an envelope, and a supplementary email covering the weekly activities sheet was sent from the science teacher to the parents. Topics were chosen based on the previous week's lesson plans. The researcher helped the teachers to develop the activity sheets. In addition, each week, the researcher sent a text message to the parents to inform them about the new activities and deadlines. The parents were asked to follow the instructions on the weekly activities sheet. These instructions were the same each week, with only the topics differing. The parents were expected to do the tasks presented in the previous chapter under the intervention section.

During the intervention, some parents failed to return the feedback forms at the specified time. When this happened, they were telephoned and asked if they had experienced any issues. Five of the parents said they did not have time to do the activities that particular week, and four others said they were very busy but would do it when they had time (see Chapter Nine).

Home visits were arranged with the parents who struggled with the activities, or with helping their child's learning, as well as other parents deemed suitable for a visit. The purpose of the home visits was to observe the parent and child when they were working together. The parents who had problems were selected according to the feedback on their feedback forms, but most of the parents did not have any issues with the activities and completed the forms without incident. In the second week of the intervention, two home visits were arranged, but one parent called and cancelled because they had not had time to do the activities at the arranged time. A total of eight home visits were arranged with different parents during the intervention. The home visits were spread over the five weeks of the intervention period.

The intervention lasted for five weeks. Most of the parents and children completed the activities, but many of them had timing issues. For example, most of them did not complete the activities at the recommended times because some parents did not have time

to spend with their children and school work, and others were busy due to their work situations. Constant communication with parents was maintained during and after the intervention, but some parents apologised for not completing the activities before the deadline. In the end, four parents dropped out after the intervention had started (see Appendix C). Two of these parents had experienced internet connection failures, one had problems with their computer, and one simply failed to respond to the weekly activities and the post-intervention.

Post-interventions for the parental involvement and children's attitudes towards science questionnaires were sent home to the experimental and control parents with their children in an envelope. They were given one week to complete and return the questionnaires, but some parents returned the questionnaires after two weeks. All experimental school parents were telephoned regarding the post-questionnaires and the end of the intervention. In addition, they were asked for a convenient time for the post-interview. Ten of the parents were interviewed just after the end of the intervention, either by phone or face-to-face. In addition, the children's experiences of the intervention were assessed with open-ended questions. The science teachers were also interviewed after the intervention to learn about their experiences and evaluations of the intervention as well as about parental involvement.

## **5.6 Data Analysis**

This section explains the data analysis methods that were used in the study. First, the calculation of the percentage mean scores used for both the pre and post-interventions are described, followed by the calculation of mean percentages for those who agreed, which was used to learn about parents' general involvement levels and the relationship between this involvement and their backgrounds. Secondly, the use of effect sizes is discussed. Thirdly, the thematic analysis of the pre and post-interviews is explained and finally this section ends by explaining how the various data used.

### **5.6.1 Calculation of the percentage mean scores and the agreeing mean percentage**

The parental involvement and parents' and children's attitudes towards science questionnaires were used for the general questionnaire analysis in Phase 1 and both pre and post-interventions. In addition, these questionnaires were used to learn about the parents' involvement in their child's learning and the relationship between their levels of

involvement and background characteristics including parent gender, science-related jobs, child gender, family education level, and either control or experimental group.

In both Phases 1 and 2, different calculations of the mean scores were used. For Phase 2 of the study, pre and post-intervention mean scores and percentage mean scores were used. Parents responded to the items on the questionnaires on scales from ‘strongly agree’ to ‘strongly disagree’, and these answers were scored from 5 to 1 for each item. Then, the total score for each construct of parental involvement and their attitudes towards science was calculated for each parent. After calculation of the total score for each construct (or collection of items), the average score was determined by dividing the total score to the number of items for each construct, and this score was then multiplied by 100 to find out the percentage score. For example, the scoring for an individual’s response to the four items on the parents’ science role construction construct is illustrated in Table 5.15 below.

Table 5.15. An example of scoring to calculate the percentage mean score

Items	Parent answer	Scoring
1	Strongly agree	5
2	Agree	4
3	Disagree	2
4	Not sure	3
<b>Total</b>		14

The total and average scores were calculated to determine the parent’s role construction scores, and the average score was then multiplied by 100 to find the percentage mean score.

The average score = the total score/the number of items =  $14/4 = 3.5$

The average score = the average score\*100 =  $3.5*100 = 35.5$

Therefore, the parent’s role construction score for this parent is 35.5.

The main reasons for using an average mean score are to clearly illustrate the scores out of 100 for each construct, to see differences in the scores between the constructs, and to standardise them, since each construct had different numbers of items.

For the first phase of the study, the mean scores were calculated according the percentage mean of items with which the respondent either agreed or disagreed. For this calculation, the “strongly agree” and “agree” categories were combined. Then, the total parent responses and the percentage mean score were calculated for each construct. For

example, for calculation of the agreeing percentage mean score, another parent answered the parents' science role construction construct as in Table 5.16 below.

Table 5.16. An example of the scoring to calculate the agreeing percentage mean score

Items	Parent answer	Scoring
1	Strongly agree	1
2	Agree	1
3	Disagree	0
4	Not sure	0
<b>Total</b>		<b>2</b>

The “strongly agree” and “agree” responses were scored as 1, and the other responses were scored 0. Firstly, the total and average scores were calculated. Then, the average score was multiplied by 100 to find the final agreeing percentage mean score.

$$\text{Total} = 2 \text{ and (the average)} = (\text{total}) / (\text{the number of the items}) = 2/4 = 0.5$$

$$(\text{Agreeing percentage mean score}) = (\text{average}) * (100) = 0.5 * 100 = 50$$

### 5.6.2 The use of effect sizes for comparison and the effect of the intervention

Effect sizes were used to report the comparison and the effect size differences of an intervention. Significance testing was not used for any data analysis of this study. The main reason for not using significance testing was that the sample size was relatively small, and the participants were not selected randomly. Since randomisation is a key element in the assumptions behind tests of statistical significance, the use of effect sizes was considered preferable here. The effect size was used to report differences between the mean scores and between pre and post-interventions.

Effect size is described as “a way of quantifying the differences between two groups” (Coe, 2002: 1) or the magnitude of the effect between two variables (Gliner et al., 2001). If a control exists, it shows the effect of an experiment on the desired variables. In addition, effect size is not influenced by sample size (Field, 2005). Effect size is calculated from mean scores and standard deviations. Cohen's d is a measurement often used for gauging effect size (Field, 2005). The following equations were used to calculate the Cohen's d effect size in this study (Norris and Ortega, 2000: 442-443):

$$\text{Effect Size (Cohen's D)} = \frac{\text{Mean}_{2(\text{post})} - \text{Mean}_{1(\text{pre})}}{\text{SD}_{\text{pooled}}}$$

$$SD_{\text{pooled}} = \sqrt{\frac{(N_{2(\text{post})}-1)SD_{2(\text{post})}^2 + (N_{1(\text{pre})}-1)SD_{1(\text{pre})}^2}{N_{2(\text{post})} + N_{1(\text{pre})} - 2}}$$

In these formulas,  $\text{Mean}_{2(\text{post})}$  and  $\text{Mean}_{1(\text{pre})}$  are, respectively, the post-intervention and pre-intervention mean scores.  $N_{2(\text{pre})}$  and  $N_{1(\text{pre})}$  represent the sample size, and  $SD_1$  and  $SD_2$  are the standard deviations of the pre and post-interventions. Cohen's  $d$  is the correlation coefficient that shows the strength of the effect between two groups or variables and the impact of an intervention (Field, 2005). The value of Cohen's  $d$  illustrates the magnitude of the effect size. The interpretations of the coefficient of the Cohen's  $d$  are as shown in Table 5.17 below.

Table 5.17. Cohen's  $d$  values and interpretations (Sullivan and Feinn, 2012).

<b>Cohen's <math>d</math></b>	<b>Magnitude of the effect</b>
< 0.20	Weak or no effect
0.20 < ... < 0.50	Small
0.50 < ... < 0.80	Medium
0.80 < ...	Large

In this study, the effect sizes bigger than 0.20 were considered to have an effect. Although the effect sizes between 0.20 to 0.40 considered to be small in magnitude, the smallest effects sizes can lead to big educational differences (Coe, 2002). There are limited number of research that looked at the impact on parental outcomes in the literature, but there is considerable amount of studies which have investigated impact on children's outcomes especially in some intervention studies. In a meta-analysis conducted by Cummings et. al. (2012), it is reported that the effect sizes of the parental intervention studies ranged between 0.17-0.45 and 0.24-0.66. This demonstrated that small to medium effect sizes can provide enough empirical evidence on the effectiveness of an intervention. For example, Ho (2007) looked of the effect of an intervention on parental home involvement, parents' confidence and parents' encouragement. Three experimental groups were used. The effect sizes differences from 0.20 to 0.60 reported to have positive impact. The effect sizes lower than 0.20 also reported, but their effects were not considered to be effective.

### **5.6.3 Thematic analysis of pre and post-interview data**

Thematic analysis was used to quantify the pre and post-interview data collected from the parents. In other words, the data were analysed according to themes that emerged from the items on the parental involvement questionnaire and responses to the interview questions. In addition, these themes were also informed by the literature review. The themes used for analysing this data are presented in more detail in Chapter Seven.

Thematic analysis is defined as “a method for identifying, analysing, and reporting patterns (themes) within data” (Braun and Clarke, 2006: 6). Working with the interview data is a process of understanding and interpreting the participants’ words and sentences based on themes in order to identify useful data related to the research questions (Matthews and Ross, 2010).

Braun and Clarke (2006) identified six steps for thematic analysis. These are:

1. Being familiar with the data;
2. Generating initial codes;
3. Searching for themes;
4. Reviewing themes;
5. Defining and naming themes; and
6. Producing the report.

The pre-and post-interview data were collected before and after the intervention from only the experimental and control parents. 24 interviews were conducted before the intervention as pre-interviews. After the intervention, 10 experimental parents participated in the post interviews. Parents interviewed by either telephone calls or face-to-face meeting by the researcher. Parents permissions were asked to records their responses. An audio recording tool was used for recordings. After completing the interview process, all audio recordings were transcribed by the researcher. Since the responses were in Turkish, the data was analysed in Turkish and then reported in English. For the analysis, Braun and Clarke’s (2006) steps were followed. First, the transcribed data (see an example of one parent interview transcript in English in Appendix U) were read several times in order to develop familiarity, and the themes were then generated based on the items from the parental involvement questionnaire and the responses of the parents. Next, the themes were identified and the data were categorised accordingly. After



categorising the data, commonalities, relationships, and differences were interpreted, and data for each theme were summarised and reported.

Similar comments were identified for each theme. Reporting all these comments were not possible due to words limit of this current study. Therefore, the comments that can support and provide better explanation to the themes and research questions were chosen, but the percentage of the similar responses were provided to demonstrate that the included comments not all the comments taken from parents. Sometimes, many similar comments that provide meaningful explanation for a theme were acquired, a random selection was made to eliminate the comments. These selections based on reporting same number of comments from both the experimental and control parents. A full discussion of the findings from the interviews appears in Chapter Seven.

#### **5.6.4 The use of various form of data**

As explained in the data collection tools section, various forms of data are used to provide the best explanations to the research questions. For phase one, mainly the questionnaires data were used, but the open-ended questionnaires and interview data were used to provide supportive explanations. Some key parts of phase one results can be better explained by providing all available data alongside each other. Therefore, the results from parental involvement, parents' attitudes towards science and children's attitudes towards science questionnaires, open-ended questions from both parents and their children, and some useful comments from parents' interviews were used together in Chapter 6.

With interview analysis, baseline equivalence of the groups, parents' experiences and ideas of parental involvement, and their views about science are important to support both phase one and phase two purposes of this study. The pre-interviews data results help to investigate parental involvement of the experimental and control parents in depths and the differences between the experimental and control groups. The qualitative data provided in depth explanations about parental involvement of the experimental and control parents presented in chapter 7.

For phase two, pre-and post-intervention questionnaires data were used to investigate the effects of the intervention, but this data only provides whether there is an effect or not. Therefore, the pre and post interviews data were used to explain why the intervention effective or not. Real effects of the intervention on parents can be explained by comparing

what parents say or think before and after the intervention. Feedback from all the participants by using weekly feedback forms, post interviews, teacher interview and children's feedback can support why some elements of the intervention were effective and other elements were not as well as which elements can be improved. The impact of the intervention on several parents and children's outcomes explained in chapter 8. Chapter 9 provided the feedbacks and the evaluations of the all participants regarding the intervention and the study.

## **5.7 Conclusion**

This chapter has described the instruments used for data collection, the selection of participants, the data collection processes, the implementation of the study, and the key approaches to data analysis. The next chapter will explain the results from the general parental involvement questionnaires and discuss the extent to which these Turkish parents were involved in their child's learning and how this involvement might vary based on selected background characteristics.

## **CHAPTER 6: THE RESULTS FROM THE QUESTIONNAIRES (STAGE 1 RESULTS)**

This chapter presents the study results collected from the parental involvement questionnaires, to answer the first and second research question: To what extent do parents' report being involved with their child's learning in science and more generally? In addition, what is the relationships between parental involvement and parents' background (Parents' gender, child's gender, career in science, school type and family education level)? The second research is that what are the parents' attitudes towards science and to what extent do parents' attitudes towards science vary according to background?

In total, 202 parents from both private and public schools answered the parental involvement questionnaire. As described in more detail in Chapter Seven, to complement this questionnaire data and to support further analysis, 24 interviews with private school parents were undertaken, and 53 open ended questionnaires were issued and completed by the public-school children's parents. This chapter summarises the findings for parental involvement, its three components and parents' attitudes towards science within the limitations of word count allowed for this thesis (see Appendix D for more detailed results). In addition, the questionnaire results were considered alongside some of the results from the interview, the open-ended questionnaire data, and the views of the children in support of some of the key sections. The following parental involvement outcomes are considered and comparisons made according to parents' background characteristics:

- Parental involvement in their child's learning in general and science learning in particular:
  - Parents' beliefs about their role in their child's general and science learning
  - Parents' self-efficacy in involvement in their child's general and science learning
  - Parents' perceptions of invitations from others to assist in their child's general and science learning
- Parents' attitudes towards science.

The following background characteristics were identified: parents' gender, child's gender, whether or not either parent had a career in science, school groups (private and public), family education level, as discussed in the previous chapter. The main reason for choosing these background characteristics was to equitably divide the parents into experimental and control groups. It is worthwhile investigating the relationship between those characteristics associated with parental involvement and its components, and parents' attitudes towards science.

### **6.1 Parental Involvement in their child's general and science learning**

Parental involvement refers to overall involvement, which combines the responses from separate themes as explicated below. Parental involvement scores were calculated by combining responses to the following parental involvement constructs: parents' role construction beliefs, self-efficacy, and perceptions of invitations from others (see chapter 5 for a fuller discussion of each component). The mean percentage of parents who agreed (either agreeing or strongly agreeing) with the items associated with these constructs was used to calculate a mean score. Parental involvement in child's general and science learning mean scores was compared with the different background characteristics collected. Tables 6.1 and 6.2 present the mean scores for parents who agreed with the statements and the effect and scope of differences, as linked to the background characteristics determining parents' involvement in their child's general and science learning.

Table 6.1 and Table 6.2: The mean scores and effect sizes differences for parental involvement in their child's general and science learning

<b>Table 6.1: The involvement in general learning</b>		<b>Mean (%)</b>	<b>SD</b>	<b>Effect Size</b>
<b>Gender</b>	<b>Male</b>	68	15	<b>0.16</b>
	<b>Female</b>	65	15	
<b>Child's gender</b>	<b>Boy</b>	66	14	<b>0.09</b>
	<b>Girl</b>	65	15	
<b>Career in Science</b>	<b>No</b>	65	15	<b>0.34</b>
	<b>Yes</b>	70	11	
<b>School</b>	<b>Private</b>	67	13	<b>0.10</b>
	<b>Public</b>	65	16	
<b>Family Education</b>	<b>Low</b>	63	15	<b>0.51</b>
	<b>High</b>	70	11	
<b>Total</b>		<b>66</b>	<b>15</b>	

<b>Table 6.2: The involvement in science learning</b>		<b>Mean (%)</b>	<b>SD</b>	<b>Effect Size</b>
<b>Gender</b>	<b>Male</b>	64	20	<b>0.29</b>
	<b>Female</b>	58	19	
<b>Child's gender</b>	<b>Boy</b>	60	18	<b>0.03</b>
	<b>Girl</b>	60	20	
<b>Career in Science</b>	<b>No</b>	59	19	<b>0.40</b>
	<b>Yes</b>	66	19	
<b>School</b>	<b>Private</b>	60	18	<b>0.00</b>
	<b>Public</b>	60	20	
<b>Family Education</b>	<b>Low</b>	56	20	<b>0.41</b>
	<b>High</b>	64	17	
<b>Total</b>		<b>60</b>	<b>19</b>	

According to both tables, the mean percentage for parental involvement in general learning (66%) was higher than involvement in science learning (60%); however, the effect size differences of mean scores was small. These results might therefore suggest that parents' involvement in their child's general learning may be higher than their involvement in their science learning, although one third of all parents thought that it was important to be involved in their child's learning.

The mean scores for involvement in learning also differed for parents with a career in the sciences and according to family education level. Although the mean scores of parents with a science based career was higher than for those who do not, the extent of the discrepancies between the mean scores was small for involvement in general and science learning. This means that parents who had a science career were more likely to be involved than other parents in their child's learning. In addition, more highly educated parents had higher mean parental involvement scores than less well-educated parents: effect size differences were medium for general learning, but small for science learning. There was also a small effect size difference between the mean scores of fathers and mothers regarding their involvement in science learning. These results might suggest that parental education level and a career in science could have a small influence on parents' involvement in their child's learning, in both general and science subjects. Moreover, parents' gender can have a small effect on involvement in science learning, with fathers being slightly more likely to respond positively to questions associated with science.

Parents who were better educated were more likely to be involved in their child's general learning than those who had exited formal education at a younger age. In addition, parents who had pursued a science career appeared to be more willing to be involved in their child's learning than those who had not. Parents with science related jobs might also be the better educated parents, thus, education level and science career may be related.

### 6.1.1 Parents' role construction beliefs in their child's general and science learning

As stated previously in Chapter Two, parents' role construction beliefs are key influencers of parental decisions to become involved in their child's learning. Such beliefs cover what they feel they should do for their children at home, and what their responsibilities are with regard to their child's learning. Parents' individual and social experiences throughout their lives affect their beliefs about their child's education, and shape their perceptions of their role in it (Hoover-Dempsey et al., 2005).

The mean scores detailing parents' backgrounds and their role construction beliefs in their child's general and science learning were compared. Tables 6.3 and 6.4 present the mean percentages for those parents who agreed with the given statements and the effect size differences linking parental background and beliefs about their role in their child's general and science learning.

Table 6.3 and Table 6.4: The mean scores and effect size differences for parents' role construction beliefs

Table 6.3: Role construction beliefs in general learning		Mean (%)	SD	Effect Size
Gender	Male	91	13	0.09
	Female	92	11	
Child's gender	Boy	91	12	0
	Girl	91	10	
Career in Science	No	92	10	0.09
	Yes	91	13	
School	Private	91	12	0.09
	Public	92	11	
Family Education	Low	91	12	0.20
	High	93	8	
Total		92	12	

Table 6.4: Role construction beliefs in science learning		Mean (%)	SD	Effect Size
Gender	Male	93	14	0.07
	Female	92	15	
Child's gender	Boy	92	15	0.22
	Girl	95	10	
Career in Science	No	92	14	0.07
	Yes	93	15	
School	Private	91	16	0.22
	Public	94	12	
Family Education	Low	93	13	0
	High	93	13	
Total		93	14	

According to Tables 6.3 and 6.4, the mean percentages for parents who agreed with the items concerning their role were high, with 92% for general learning and 93% for science

learning. This high score might be because almost all of the parents valued their child's education. These parents spend extra money to ensure the best education for their children, whether educating them in a private school or sending them to an after school centre (preparatory school) in the case of the public school parents. Since they have high role construction beliefs, their involvement in their child's learning may also be high.

The small effect size difference between higher and lower educated parents' mean scores for parents' role construction beliefs in general learning, suggest higher educated parents have similar role construction beliefs with lower educated parents. The percentage of parents who agreed and disagreed with each of the questions that comprised the role construction belief construct is presented in full in Appendix D. The agreement for higher educated parents was slightly higher than that of the lower educated parents regarding items relating to their role in helping their child with their homework and learning. Similar beliefs were also reported in the interviews. Some of the less well-educated parents stated that they were not capable of assisting their children with their homework because of their low level of education, for example:

“We absolutely couldn't help with our child's homework because both of us graduated from primary school only. We aren't able to help with anything and we can't do anything about that” (15, Mother of a boy).

Although less well-educated parents believed themselves to be less capable of assisting their children with their learning and homework, they did feel that they should help with this but feel unable to do it.

There were minimal differences between parents' role construction beliefs concerning general learning and other background variables. These may suggest that parents' role construction beliefs were shared regardless of background. In contrast, parents' role construction beliefs in science learning showed small effect size differences between parents with a science based career and the remainder of the sample. Parents with a science career may have a slightly higher mean score than parents who do not. In addition, interestingly, public school parents' mean scores were higher for their beliefs regarding science learning than the mean scores of the private school parents, with a small effect size difference. There were no differences associated with the other background variables, including level of education, which differed for parents' role construction beliefs with regard to general learning. According to the table in Appendix D, public

school parents agreed more than the private school parents regarding the items about their responsibilities to assist their children with science learning at home, and awareness of what their child is learning in science. With the exception of small differences between school groups regarding parents' role construction beliefs in science learning, most Turkish parents valued their child's science learning and saw science as an important subject to benefit their child's future. According to the interview data (see next chapter for more detail), the majority of parents thought that science was important for their child because they believed that science would benefit their children's daily lives, help them to attain better marks in their national exams, help them in future science lessons, and contribute to their future job. For example:

"I believe that science will help my child in his life. He can use it in his daily life or in other circumstances such as his future job." (C53, Mother of a boy)

"I don't know if it will help her in choosing her career. If she decides a science related career, obviously, the current science learning will be important for her. Knowledge about the human body and human relationships is a very good thing." (28, Mother of a girl)

"It will help her to get higher marks in the national exams." (C17, Father of a girl)

### **6.1.2 Parents' self-efficacy in their child's general and science learning**

Another important component of parental involvement is parents' self-efficacy in their child's general and science learning. Indicators of parents' self-efficacy in their child's learning include how effectively they think they can help their child and how able they feel to provide support. Tables 6.5 and 6.6 present the mean percentage scores for parents who agreed with the questions raised in the self-efficacy construct, and the effect size differences results according to parents' self-efficacy in their child's general and science learning.



Table 6.5 and Table 6.6: The mean scores and effect size differences for parents' self-efficacy in their child's general and science learning

Table 6.5: Efficacy in general learning		Mean (%)	SD	Effect Size
Gender	Male	70	27	0.15
	Female	66	26	
Child's gender	Boy	70	24	0.24
	Girl	64	28	
Career in Science	No	66	27	0.28
	Yes	73	22	
School	Private	70	27	0.23
	Public	64	26	
Family Education	Low	61	26	0.61
	High	76	25	
Total		67	26	

Table 6.6: Efficacy in science learning		Mean (%)	SD	Effect Size
Gender	Male	67	29	0.25
	Female	60	29	
Child's gender	Boy	65	28	0.20
	Girl	60	29	
Career in Science	No	60	29	0.46
	Yes	73	28	
School	Private	65	29	0.18
	Public	60	29	
Family Education	Low	55	29	0.60
	High	72	29	
Total		62	29	

In Tables 6.5 and 6.6, the mean score for parents' self-efficacy in general learning (67%) was higher than their self-efficacy in science learning (62%). This may suggest that Turkish parents feel more confident about helping with their child's general learning than their science learning.

According to Tables 6.5 and 6.6, the mean scores differed relative to child's gender, parental career in science, and family education level, relative to both general and science learning. The mean scores for boy's parents were slightly higher than for girl's parents for both types of learning; however, the effect size differences were small. According to the self-efficacy tables in Appendix D, boy's parents agreed more with items about helping and explaining their child's homework to them than girl's parents for both types of learning. These parents might also perceive themselves more confidently.

According to Table 6.5, mean scores differed between school groups for parents' self-efficacy in general learning; however, the effect size for this difference was small. Private school parents reported higher mean scores than public school parents. This may suggest that private school parents were more confident about assisting in their child's general learning. This may be because they are typically more highly educated. In addition, in Table 6.6, the mean scores between the genders of parents differed for their self-efficacy in science learning, with a small effect size difference. Fathers' mean scores were slightly higher than mothers were, as fathers may feel slightly more confident about helping with their child's science learning.

Moreover, the mean scores for parents with a science based career was higher than for those who did not, although the effect size differences between the mean scores was small for both types of learning. Regarding self-efficacy in science learning, parents with a science career agreed more than other parents with those items directly related to assisting their child's learning. These parents may be more knowledgeable about science and other subjects, and may use this knowledge to help their child's learning.

Education levels may also have an influence on parents' self-efficacy in helping their child's science and general learning. The more highly educated parents had higher mean scores than the less well-educated parents, and the effect size differences were medium for both groups. The well-educated parents might also have direct experience of their child's school topics, and therefore they may feel more confident in helping their child's learn about these aspects. However, higher educated parents also face barriers to helping their children learn. According to the interview results, even though higher education level parents said that they were helping their child's learning at home, they faced some difficulties. These difficulties were that their help was limited to a certain subject area, they had forgotten many of the subject areas their children were studying, and they had encountered a different education system (see next chapter for more details, under the parents' self-efficacy section in relation to the interview results).

Fewer less well-educated parents agreed with the statement "I know how to support my child's learning" item than better educated parents (See the table in Appendix D). However, these parents aimed to support their child's learning by providing whatever information they could to help. To determine what sort of support they were providing for their child, the same questions were asked of the lower educated parents in the form of open-ended questions. These covered, providing the materials their child need, sending their child to an after school centre, and assisting with difficulties answering test questions were the themes that emerged from the parents' responses of these. An example responds for each theme as the followings:

"I am trying to buy my child all the materials he needs. I buy more books than his teachers suggest to help improve his school success" (Mother).

"I send my child to an after school centre or any course that the school provides. I am trying to do what I can" (Mother).

“I buy more tests and practise books and send him to an after school centre to better prepare him for the national exams” (Mother).

“I am helping him with the questions he struggles to answer and I communicate with his teachers regularly” (Mother).

“I am trying to help him with topics or questions he struggles with, if I understand them. I try to what I can” (Father).

In addition, similar questions were also asked of these parents’ children in an open-ended questionnaire, which 57 children answered. The responses of the children differed from their parents. Pushing and warning them to do more study at home, providing them with a silent home environment and providing them with information about what to do were the main themes raised in the children’s answers. The majority of the children stated that their parents were pushing and warning them to do more study at home. The children complained that they did not want their parents to push or warn them to do more home study.

“My parents warn me and send me to my room to do more study and answer more test questions. In addition, they compare me with my cousin who is more successful than me. I don’t want them to do that and I want them to leave me alone” (Girl).

“They believe that when they push and warn me to do more study at home, I will study, but I do not study. They are always repeating that and I don’t want study when they warn me” (Girl).

“My parents always tell me to study more effectively at home. They push and warn me. I think they should show me how to study more effectively instead of warning me” (Boy).

Less well-educated parents agreed with the item: “I can make a significant difference in my child’s school success” (see the table in Appendix D). Questions about this item were also asked in the form of open-ended questions. Making them to do more study, getting help from the teacher, improving morale (interest, encouragement, motivation), and studying together were the themes that emerged from the parents’ responses. For example:

“If he studies effectively and regularly, his success rate will increase” (Father).

“His rate of success will improve if he studies continuously by answering more test questions and by doing more revision” (Mother).

“I need to warn him to do more study at home and I also try to help him when he struggles with topics or questions” (Father).

“I can increase my child’s success rate by showing more interest in his learning, communicating with his teachers by asking them what can I do to help and working together with him on his homework and test questions” (Mother).

Most of the parents believed that encouraging their child to study and practice more at home would improve their child’s success at school. Therefore, parents tried to provide a good home environment for their child and pushing them to study more. However, based on the responses of the children, being pushed and warned by their parents was not helpful to them, and might discourage them.

Overall, although the parents agreed at a rate of 60 percent that they had self-efficacy in terms of helping their child’s general and science learning, they have some difficulties in doing so (especially the less educated parents). All the parents were doing what they thought was best to improve their child’s learning.

### 6.1.3 Parents’ perceptions of invitations from the teacher and their child to help their general and science learning

Parents’ perceptions of invitations from others (from teachers and their child) to assist with learning at home were the final component of parental involvement. Tables 6.7 and 6.8 present the mean percentages for parents who agreed to such invitations, and the results in terms of the effect size differences regarding parents’ backgrounds and perceptions of invitations from others regarding their child’s general and science learning.

Table 6.7 and Table 6.8: The mean scores and effect size differences for parents’ perceptions of invitations from others

Table 6.7: The perceptions of invitations for general learning		Mean (%)	SD	Effect Size
Gender	Male	47	25	0.03
	Female	46	23	
Child's gender	Boy	45	23	0.09
	Girl	47	24	
Career in Science	No	45	24	0.23
	Yes	51	19	
School	Private	45	19	0.09
	Public	47	27	
Family Education	Low	44	25	0.20
	High	49	18	
Total		46	24	

Table 6.8: The perceptions of invitations for science learning		Mean (%)	SD	Effect Size
Gender	Male	41	32	0.23
	Female	34	28	
Child's gender	Boy	32	27	0.19
	Girl	38	30	
Career in Science	No	34	29	0.20
	Yes	40	31	
School	Private	32	27	0.22
	Public	39	31	
Family Education	Low	35	31	0.01
	High	35	24	
Total		35	29	

In Tables 6.7 and 6.8, the agreed mean percentages that correlated with questions about the perceptions of invitations from others section were low, at 46% for general learning

and 35% for science learning. This component of parental involvement resulted in the least positive response from all the three components. This may suggest that those parents who wanted to be involved in their child's learning felt that they were able to offer support (the first 2 components) but did not feel that they had been supported in doing so, either by teachers or their own child. Moreover, the mean score for parents' perceptions of invitations from others regarding science learning were lower than the invitations for general learning. Parents felt less supported to help their child's science learning than to assist in general learning, both from their child and the teachers.

The mean scores differentiate parents' science careers and their involvement in both types of learning. The mean scores for parents with a science related career were higher than for those who do not have a science related career, as regards responsiveness to invitations from others to engage in general and science learning; however, the effect size differences between the mean scores were small for both types of learning. All parents might receive the same type of invitation from others. In addition, education level might not significantly affect the level of invitations extended to parents to support their child's general learning. Although more highly educated parents had higher mean scores than less well-educated parents, in terms of the perceptions of invitations from others for general learning, the effect size differences were small. According to the responses to items concerning invitations from others table in Appendix D, the science career parents and the higher educated parents agreed more with the item referring to whether teachers asked them to help their child with their homework. The teachers may see these parents as more capable at assisting their children with learning in general and science specifically. In addition, more parents with a science based career and the higher educated parents agreed that their child asked for help with their homework and for more explanation about what they are learning in their lessons. The children of these parents might also perceive their parents as more capable of helping them with their learning, both in general and in science. Conversely, less well-educated parents, and parents with careers outside the sciences agreed with the statement that "one of the teachers explained them how to help their child's learning". The teachers may have seen these parents struggling to help their child's general learning, and then might have explained to them how to help. Less well-educated parents might have received more help about how to help their child with science from the science teacher.

According to Table 6.8, parents' perceptions of invitations from others to assist their child's learning in science might vary according to parents' gender and school groups. There were small effect size differences between the mean scores for fathers and mothers regarding perceptions of invitations to assist their children with learning science. Although fathers had higher scores than mothers, fathers and mothers may receive the same invitation to help science learning of their child. In addition, public school parents had higher mean scores than private school parents, but the effect size difference was slight. According to parents' responses to the items presented in Appendix D, public school science teachers seem to be more likely to invite parents to assist their child's science learning than those at private schools. In addition, public school children may share more about their learning in science with their parents than private school children. Private school children might ask for more help from their parents than public school children when working on their homework, or in their general learning.

## **6.2 Attitudes towards science**

The principal focus of this study is the effect of the intervention on parental involvement in general and science specifically. Since the intervention was based on the science activities via an online website, the effects of the intervention on parents' attitudes toward science is worth mentioning. In addition, when providing additional information regarding the third and the sub-question for the second research question, this section provides additional data about Turkish parents' and children's attitudes towards science and its relationship with their background. Therefore, both parents' and children's views about science are important. Parents' attitude was determined according to a scale based on the parental involvement questionnaire. More details about attitudes towards science were given in the previous chapter, which reported on the questionnaire concerning attitudes towards science.

### **6.2.1 Parents' attitudes towards science**

The mean percentages for parents who agreed with the questions on the parents' attitudes questionnaire were compared with parents' backgrounds. These results helped to clarify Turkish parents' attitudes towards science and how their attitudes relate to their background. These results also provided baseline information regarding attitudes. Table 6.9 presents the mean percentages and effect size differences linking parents' backgrounds and their overall attitudes towards science. Parents' attitudes towards

science questionnaire combined two constructs. First, parents' own ideas about science, and then their ideas about their child's science learning.

Table 6.9 below illustrates that 74% of parents confirmed the items describing attitudes towards science. These results demonstrate that parents had positive attitudes towards science, as they agreed to three-quarters of all statements. According to the interview results (see next chapter for more details), the majority of parents see science as important and value the science their child learns. They believe that their current science learning will help their children in their daily lives, and help them to attain marks in their national exams, as well as assisting them further in their science lessons and contributing to their future job prospects.

Table 6.9: The mean scores and effect size differences for parents' overall attitudes towards science

The attitudes towards science		Mean (%)	SD	Effect Size
Gender	Male	75	20	0.08
	Female	74	18	
Child's gender	Boy	75	20	0.04
	Girl	74	17	
Career in Science	No	73	18	0.30
	Yes	79	22	
School	Private	74	21	0.05
	Public	75	16	
Family Education	Low	75	15	0.02
	High	75	22	
Total		74	19	

In table 6.9, the mean scores differed slightly for parents with a science career. The mean scores for parents' who have a science career was higher than for those who do not; but the effect size differences between the mean scores was small. Those parents with a science career may see science as more valuable, and therefore, may have more positive attitudes. In addition, there were no differences associated with other background variables. These results suggest that parents' attitudes towards science may be similar regardless of parent's gender, child's gender, school group and family education level. This may be because parents see science as valuable and useful for their children to learn.

### 6.2.1.1 The components of parents' attitudes towards science

Parents' own ideas about science, and their ideas about their child's science learning were the two main components of their attitudes towards science. Tables 6.10 and 6.11 present the mean percentages for parents who agreed with the items associated with these components, and the effect size differences results according their backgrounds.

Table 6.10 and Table 6.11: The mean scores and effect size differences for the components of parents' attitudes towards science

Table 6.10: Parents' own ideas about science		Mean (%)	SD	Effect Size
Gender	Male	70	23	0.13
	Female	67	21	
Child's gender	Boy	67	23	0.04
	Girl	68	20	
Career in Science	No	67	21	0.22
	Yes	71	23	
School	Private	69	24	0.09
	Public	67	19	
Family Education	Low	67	18	0.21
	High	71	27	
Total		68	22	

Table 6.11: Parents' ideas about their child's science learning		Mean (%)	SD	Effect Size
Gender	Male	81	24	0.01
	Female	80	24	
Child's gender	Boy	82	25	0.11
	Girl	79	23	
Career in Science	No	79	24	0.17
	Yes	83	23	
School	Private	79	26	0.15
	Public	82	22	
Family Education	Low	84	20	0.25
	High	78	27	
Total		80	24	

In Tables 6.10 and 6.11, the mean score for parents' own ideas about science (68%) was lower than their ideas about their child's science learning (80%). This demonstrates that the majority of parents viewed their child's science learning positively, notwithstanding their own ideas about science.

In table 6.10 regarding parents' own ideas about science, the mean scores were slightly different for careers in science and family education, but the effect size differences were small. The mean score for parents with a science career was slightly higher than that for those who do not have a science career. In addition, more highly educated parents had a more positive attitude towards science. The higher educated parents also had higher mean scores than the lower educated parents. A career in science and education level may correlate, because parents who have a science career might also be well-educated parents.

On the other side, in Table 11, the mean scores only differ for family education, but the effect size of this difference is also small. The less well-educated parents had higher mean scores than the more highly educated parents. Interestingly, the less well-educated parents



held more positive views regarding their child's science learning than the well-educated parents.

### 6.2.2 Children's attitudes towards science

In total, 167 Year 7 children completed the questionnaire. 53% of these children were boys and 83% were from private schools. The agreed mean percentages for the questions for children's attitudes overall towards the science questionnaire and the effect size differences for the mean scores for child's gender and school group are presented in table 6.12

Table 6.12: The overall mean scores and the effect size differences for children's attitudes towards science

		Child's Attitude towards science			
		Percent (N)	Mean (%)	SD	Effect Size
<b>Gender</b>	<b>Boy</b>	53	70	22	<b>0.51</b>
	<b>Girl</b>	47	59	24	
<b>School Group</b>	<b>Private</b>	83	64	24	<b>0.26</b>
	<b>Public</b>	17	70	23	
<b>Total</b>		<b>167</b>	<b>65</b>	<b>24</b>	

65% of the children agreed with the items on the questionnaire. This might suggest the children hold positive views overall regarding science. According to table 6.10, the mean scores differed relative to children's gender and school group. The mean scores for the boys was higher than for the girls and the effect size differences between the mean scores were medium. Boys' attitudes towards science were more positive than girls' attitudes. In Appendix E, the percentage of agreement and disagreement with the each of the items in the questionnaire was presented according to each component of the children's attitudes towards science. According to the table in Appendix E, more boys agreed with the majority of the items concerning learning science in school, self-concept in school, learning science outside of school and future participation in science components.

In addition, although 17% of the children were from public schools, the mean score for these children was slightly higher than the private school children's mean scores; however, the effect size differences were small. These may suggest the attitudes towards science among public school children may be more positive than that of private school children. According to the table in Appendix E, most public school children agreed with the items expressing interest in science learning, self-concept in science, science outside

school and future participation in components associated with science. In addition, more private school children preferred science to other subjects and more private school children thought that their father enjoy science. Overall, children's attitudes towards science were slightly more positive among children, and boys held more positive attitudes towards science than girls.

### **6.3 Conclusion**

The main purpose of this chapter was to identify parents' involvement and the relationship in the three components of parental involvement regarding their backgrounds. The findings can be summarised as follows:

- Parents' involvement in their child's general learning were slightly higher than their involvement in science learning, but overall involvement scores were high for both. Parents who were better educated were more likely to be involved in their child's general learning than those who had a lower level of education. In addition, parents who have a science based career claimed to be more involved in their child's learning than those who do not have a science based career.
- The role construction beliefs of parents were very high relative to both their child's general and science learning. The high scores might be explained by the fact that almost all the parents valued their child's education and believed they should be responsible for overseeing it. Parents' beliefs regarding their role construction were largely similar despite the backgrounds variables, even though there were some small effect size differences for some variables.
- Parents' self-efficacy in helping their child's general learning were higher than their self-efficacy in science learning. Parents' self-efficacy in helping their child's general and science learning may be affected by their career and their education level (towards higher education level). More highly educated parents were more confident about helping their child learn in both contexts, than lower educated parents. Parents who have with a career in science were more confident about assisting their child's science learning than parents who did not; but they were similar in terms of assisting their child's general learning. Although well-educated parents had higher score, they also faced some difficulties in helping

their children; such as limited knowledge of certain subjects, forgetting topics, and exposure to a different education system.

- Few parents had been invited, by either teachers or their child, to help with their child's general and science learning. The perceptions of invitations for assistance in general learning of their child were higher. The perceptions of invitations were similar for all the backgrounds variables, although fathers, parents who have a career in science, and public schools' parents received slightly higher mean scores, the effect in terms of size differences were small. In addition, education level may not greatly affect the invitation level of parents choosing to help with their child's general and science learning.
- Parents' overall attitudes towards science was found to be positive, based on the participants. Parents' attitudes towards science may be only affected by the variable of a science career, but there were no differences for other backgrounds. In addition, parents' own ideas about science might be affected according to their science careers and their education level (towards higher level), but differences were small. However, parents' ideas about their child's science learning were almost similar for all backgrounds except education level. Less well-educated parents expressed more positive ideas about their child's science learning, although the effect size was also small.
- Children's attitudes towards science were affected by their gender and their school. Boys had more positive attitudes towards science and public school children were also found to have slightly more positive attitudes towards science.

In the next chapter, detailed results from the interviews with the experimental and control groups are explained.

## **CHAPTER 7: BASELINE DATA FROM PARENTS WHO TOOK PART IN THE INTERVENTION**

In Chapter Six, the general questionnaire data results for phase one of the study, which surveyed parents of children who attended either a private or a public school, were presented to provide general information regarding their views on the extent of parental involvement in children's learning, and their attitudes towards science specifically. As only the private school children and their parents participated in the intervention (more detail about the intervention can be found in Chapter Four), additional and detailed information about these parents and their children regarding parental involvement and their attitudes towards science was established prior to the intervention. Therefore, in this chapter, the data for the parents of children who attended the two private schools and agreed to participate in the intervention will be explained. The phase one results provide insight about the parents of children who attended either a private or a public school.

The main purpose of this chapter is to provide more detailed information about the experimental and control parents prior to the intervention in order to investigate the effects of the intervention by comparing the pre and post-results as a baseline to gauge behaviour that may or may not have changed as a result of the intervention. The second aim is to provide further context to the questionnaire responses. In addition, the data provides information about the baseline equivalence of the two groups. Since the groups were formed using matching, some slight differences may have existed prior to the intervention and these differences will be investigated and reported in this chapter. The parents were interviewed before the intervention; interviews were conducted with 24 parents who had been allocated to the experimental or control groups.

The following themes emerged with regard to the items of the parental involvement questionnaire and from the responses of the parents in the interview. Most of these themes run parallel to the questionnaire in the previous chapter. This section will be structured according to these themes, which are outlined as follows:

- Parents' reported involvement in their child's education
  - a) Parents' active role in helping with their child's homework
  - b) Child's interest in completing their homework and studying at home
  - c) Current level of parents' support for their child's learning at home

- Parents' role construction beliefs regarding their child's learning
  - (a) Communication with the school
  - (b) Helping or guidance with homework
  - (c) Preparing their child for future life
  - (d) Providing a positive home environment
  - (e) Providing a good education
- Parents' ideas regarding their self-efficacy in their child's learning
  - (a) Parents' self-efficacy in general and science learning
- Invitation from others
  - a) Child's request for help from their parents
  - b) Teacher's request from parents to help with their child's learning at home
  - c) Parents' communication with the teachers
- Parents' views about their child's learning of science

## **7.1 Parents' reported involvement in their child's education**

This section will describe parents' reported involvement in their child's learning. The role of parents in their child's home studying, and parents' ideas about their child's interest in completing their homework, can be deduced from the interview results, which will be presented in this section. Then, the ways in which parents support their child's learning at home will be explained. The purposes of this section is to understand what parents think that their role should be, what they actually do to support their child and how interested their child is in completing their homework.

### **7.1.1 Parents' active role in helping with their child's homework**

The results of the interviews indicate that Turkish parents assign a high importance to their children's homework. In their view, parents have various different responsibilities related to ensuring that their child completes their homework. Their answers reveal that, in terms of what they actually do to help with their child's homework, there are two types of parents: parents who push their child to work, and those who do nothing. Most of the interviewed parents (64%) said that they push their children to complete their homework; some of these parents gave the following responses:

“He is mostly willing to do his homework, with a small push. However, we mostly push him to do extra homework” (E3, mother of a boy).

“We make him sit at his table with our small push. I ask him, “What homework do you have? Do you have any homework for tomorrow? When should you have completed it?” He also has homework from the after school centre. I say to him, “Look, you should complete your homework today without leaving it until tomorrow.” Otherwise, he doesn’t complete it. Let’s say he has homework that needs to be completed for tomorrow, but he mostly doesn’t care about that. Therefore, we need to push him to do his homework” (E22, mother of a boy).

“My child generally completes his homework, but sometimes he doesn’t want to do it and we try to interfere in this situation. We tell him, “If you have plans for your future you have to complete your homework, and you should revise your lessons at home” (C33, father of a boy).

These parents generally reported that they feel they have to control and interfere with their child to ensure that they complete their homework. In this way, if they identify any issues, they can warn and push their children, or help them to complete their schoolwork. They also expressed that they believe their children may not realise the importance of or the responsibility for completing their homework.

However, in contrast to the responses quoted above, other parents reported that they don’t do anything regarding their children’s home studying. These parents said that they do not interfere with their child’s learning at home or with completing homework, and gave the following responses:

“We don’t put any pressure on her to complete her homework. She needs to understand her responsibilities because she is not a child anymore” (C23, mother of a girl).

“We don’t apply any pressure. Putting on pressure to study at home is not a good thing; it may harm her” (C43, mother of a girl).

“My child does her homework everyday correctly and constantly, according to a plan, without any pressure or pushing” (E28, mother of a girl).

These parents reported a belief that pushing or interfering with their child in relation to home learning or completing homework is not a good thing for their child. They preferred to leave their child alone to be independent and responsible for their own learning; however, these parents may help their child if they are struggling with particular questions or homework.

Overall, these results show that, although all of the parents do care about their child’s education, they may act differently in terms of how active a role they take in relation to

their child's homework. Most of the parents said they push and warn their child to do their homework. The others allow their child to be independent and responsible for their homework, but they might support their child if they struggle with homework or have questions. These results were same for both the experimental and the control parents.

### **7.1.2 Parents' views regarding their child's interest in completing their homework**

It is important to determine children's actual situation regarding their interest in completing their homework. According to the responses given by parents, most of the children are willing to complete their homework and to study at home, but some of the children do not want to do their homework or study at home.

The parents who said their child is willing to complete their homework or study at home also reported that their child completes their homework and studies at home regularly and willingly, according to a plan and before the homework deadline. However, some of these parents mentioned that their child sometimes experiences problems with completing their homework, for example if they do not like the topic, or if the homework is lengthy, which might bore the child. Some of the responses given by the parents were as follows:

“She completes her homework on the day she receives it, and she generally does her homework every day. She completes the homework for the lessons that she like first, but if she has homework that she doesn't like, either because of the teacher or the lesson, she does not do this homework willingly” (E14, father of a girl).

“She completes her homework according to a plan by herself. She receives homework from different lessons and teachers, but some of her homework is very long. This kind of homework can bore her” (C17, father of a girl).

“My child has a plan to follow for his studying at home and he generally follows this plan. Of course, sometimes he may not follow it, or doesn't want to follow it” (C33, father of a boy).

“She studies at home when she wants. She says, “I don't have homework for tomorrow, but I have some for Thursday or Friday,” and she studies accordingly. However, she completes all her homework willingly. I don't tell her to go and do her homework or to study at home because she does this willingly and consciously” (E19, mother of a girl).

Some other parents (32%) said that their child is not enthusiastic about doing their homework or studying at home. In particular, they complained about their children not studying regularly or willingly. According to some of these parents, their child wants to spend their time doing different things, due to their being at a transition age, moving from

childhood to early youth, and wanting to spend time with their friends. Some other parents mentioned that their child lacks a sense of responsibility for doing their homework. These parents gave the following responses:

“He is not enthusiastic about doing his homework. He does not say, “I will go and do my homework,” he sometimes wants to do it and sometimes he doesn’t. He doesn’t feel any responsibility” (E15, mother of a boy).

“My daughter studies for her lessons and does her homework willingly, but since she turned 12 years old, she has been more curious about social things and spending time with her friends. We have a serious problem with that” (C3, mother of a girl).

“He generally doesn’t want to do or concentrate on his home studying or his homework. He doesn’t have any consciousness of this. Let’s say he has homework for tomorrow, he might not care or mind about that. He spends his time doing different things” (E22, mother of a boy).

“He does not study regularly and willingly. When he comes home from school he spends just ten minutes on his homework and that’s all. He wants to do other things that he likes” (C53, mother of a boy).

Overall, parents held mixed views about their child’s interest in completing their homework. Since the children they were describing are close to a transitional age, moving from childhood into early youth, the children are interested in doing other things, rather than focusing on their learning or homework, especially in the case of children who do not complete their homework or study at home regularly. According to parents, children are easily distracted. Their interest in their teachers, subjects, friends and the type of homework they receive can all affect their interest in completing homework or studying at home.

### **7.1.3 Current level of parents’ support for their child’s learning at home**

This section will examine what parents actually do to support their child’s learning at home. The parents in both the experimental and control groups help their child’s learning at home, in different ways. The parents’ responses reveal three themes regarding how parents support their child’s learning. These themes are: working together, giving moral support and encouragement and getting help from others. These methods will be examined in turn in the following subsections.



### **7.1.3.1 Working Together**

The majority of the parents who support their child's learning at home said that they help their child when they see that they are struggling or need help when learning at home, and that they work together with their child to support their learning. These parents generally help with the questions that their child is struggling with, ask questions about the topics and discuss the main idea of the homework or the questions. Some of the parents read about the topics beforehand to provide better help for their child. The following responses were given by parents regarding the ways in which they help:

“We try to ask questions to see whether she can explain her ideas about the topics or not. We share our ideas about the topics in this way” (E14, father of a girl).

“If I read about the science topics beforehand I can explain them to my child. She can explain what she knows about the topic and I also explain what I understand, if I have read it beforehand. We share our understanding with each other like this” (E10, mother of a girl).

“I interfere with my child's learning when I see him struggle. I ask him which questions he can't answer and then I tell him, ‘Let's answer them together’” (E22, Mother of a boy).

“Since the education system is different, I need to revise the topics in order to help my child's learning at home” (C53, Mother of a boy).

“I don't directly provide information about the topic that she is struggling with, but I explain the main idea and I direct her towards further information about it. I also encourage her to do more research about scientific topics that she doesn't understand” (C58, father of a girl).

### **7.1.3.2 Giving Moral Support and Encouragement**

All parents value their child's learning and they feel that they should be involved by doing what they can to support their child. Some parents who felt they couldn't directly help with their child's learning try to become involved through encouragement, rewarding and showing an interest in their child's learning. Therefore, these parents are able to adopt different strategies to support their child's learning.

“I think encouragement is an important thing. I reward my child when she completes her homework; the reward is letting her watch her favourite television series or giving her a gift. Therefore, I think rewarding is important” (14, father of a girl).

“We can only help to motivate our child to learn and to complete her homework” (C11, father of a girl).

“I show an interest in my child’s learning when I am at home. I control her working at home and ask questions about the homework she has” (10, Mother of a girl).

### **7.1.3.3 Getting help from others**

The parents reported that they are not able to help with their child’s learning all of the time. They try to help with what they can do, but prefer to get help from others when they can’t help; the reasons for this are explained in the self-efficacy section. These parents direct their child to their schoolteachers to get help when they are unable to assist with their child’s learning. Most of these parents also send their child to a preparatory school; both to support their learning and to prepare them for the national exams so that they can attend a good upper secondary school (see Chapter One). Overall, all of the parents generally prefer to get help from school teachers, the internet, their child’s siblings, a preparatory school, private tutor or their neighbour’s children, who can all help with their child’s learning.

“I encourage my child to get help from our neighbour’s daughter when I see her struggling with her homework. I tell my child, ‘Go and ask her to explain and show you how to do your homework’” (C3, mother of a girl).

“She can use the internet when we can’t help. She shows the questions or the topics that she struggles with to her teacher” (E28, mother of a girl).

“We are getting help from a preparatory school. When we can’t help, we tell her to ask her teacher at school about the questions that she is struggling with, and we check whether she has asked them or not” (E14, father of a girl).

“She has two older sisters. She can get help from them when she struggles with her questions or her homework. She can also get help from the neighbour’s daughter, who is in Year 9” (E19, mother of a girl).

Overall, parents from both the experimental and control groups support their child’s learning by working together with their child, providing moral support and encouragement or getting help from others when they can’t help themselves. The parents who are able to help their child’s learning do this by helping with the questions that their child struggles with, asking questions about the topics, explaining the main idea of the homework, explaining the questions or reading about the topics beforehand to provide better help to their child. On the other hand, the parents who are not able to help with their child’s learning support them by providing moral support and encouragement or by getting help from others. All the parents are proactive in seeking support for their child when they are unable to help; they get this help from the school teachers, the internet,

siblings, a preparatory school, a private tutor or neighbours' children, who can all potentially help support their child's learning.

## **7.2 Parents' role construction beliefs regarding their child's learning**

Parents' beliefs regarding their role and responsibilities in regard to their child's learning are an important component of parental involvement. This theme reveals parents' actual beliefs regarding what they ought to be doing to help with their child's learning. The following themes emerged from the responses of the parents regarding their responsibilities in relation to their child's learning; these themes summarise the most salient responses given by the parents:

- Communication with the school
- Help or guidance with homework or studying at home
- Preparing their child for future life
- Providing a positive home environment
- Providing a good education

### **7.2.1 Communication with the school**

Parents' communications with the school are important for teachers, children and parents (Hollingworth *et al.*, 2009). Some of the interviewed parents (30%) reported a belief that they should communicate with their child's school and teacher to solve any issues that their child encounters, and to improve their child's success, both educationally and socially. They believe this to be one of their responsibilities. The following responses were given by parents in both the experimental and control groups:

“Parents should communicate and have a dialogue with their child's teachers. Any family has limited capabilities to help their child, both with their learning and in their social life, but they can get help from the school. The school is there with all the services for that” (E14, father of a girl).

“I communicate with the teachers when we have an issue with my child. I ask them how we can resolve it, but I can't do it regularly because of my work situation. I don't have enough time for this. However, I think that I am very involved, for a normal parent, though actually, I should be more involved” (E22, mother of a boy).

“I think I have a lot of responsibilities. I believe that education starts in the family. Therefore, I attend all the programmes the school provides regarding my child's development, psychology and the consulting service. I listen very carefully to what I can do to help my child. I buy and read the books that they recommend because I need to be knowledgeable in order to guide my child. I try to do this with all my

strength. For example, if I encounter any issues that I don't understand or that make me worry, I ask my child's teachers about them directly and ask them what I should do" (C3, mother of a girl).

### **7.2.2 Helping with or guiding homework or home studying**

The second theme that emerged from parents' responses was parents' beliefs regarding their responsibilities in helping with or guiding their child's homework or studying at home. Almost half of the interviewed parents mentioned this theme. Most of these parents accept that they are responsible for helping with or guiding their child's homework or home studying, but some of them do not see this as their responsibility. The parents who do recognise this as their responsibility reported a belief that they should control, guide, encourage and help with their child's homework and any question they struggle with, and gave the following responses:

"First of all, fathers, or parents, shouldn't do their child's homework, but they should give them guidance, with their homework or with the questions that they struggle with. They should show them how to find the correct answer. For example, "If you do it this way, you will find this result. Or you can do it like this." The parent shouldn't do their child's homework for them without giving any explanation to their child" (E14, father of a girl).

"On an individual level I am trying to help with my child's learning at home because the current education system doesn't require my child to be responsible for his learning, to be aware of his responsibilities and to study regularly at home when we leave him alone. I think the current education system is to blame, but this may be the case for everyone. We, as his parents, may be guilty. Therefore, we are trying to fulfil part of our responsibilities by helping him at home" (E22, mother of a boy).

"I think my responsibilities are to control and regulate her studying at home and her homework, but because of my low education level, I cannot directly help her learning" (C23, mother of a girl).

"My responsibilities regarding her learning are to keep track of her studies and her successes, to determine her real interests and to help and guide her with her homework" (C58, father of a girl).

Two of the interviewed parents (25%) from the control group reported a belief that helping or guiding their child with their homework or questions they're struggling with shouldn't be their responsibility; rather, they believe it is the responsibility of the teachers. These parents gave the following responses:

"I don't see helping my child with their homework as my responsibility. I don't help him with his studying or topics he is struggling with at home. This is also true

for science. To tell you the truth, I haven't done anything for him this year" (C33, father of a boy).

"I don't accept that it is my responsibility to help my child with homework or topics they are struggling with. I say, 'If you are struggling with this topic, you don't understand it. Therefore, tomorrow, you must go and ask your teacher to explain the topic to you again'" (C3, mother of a girl).

Overall, most of the parents from the both groups said they think that helping or guiding their child with their homework or studying at home is their responsibility; however, some parents from the control groups do not see this as their responsibility, as they believe teaching and helping their child with questions or homework is the responsibility of their teachers.

### **7.2.3 Preparing their child for future life**

The third theme that emerged from the parents' responses regarding their responsibilities was preparing their child for future life. The minority of parents from both groups expressed a belief that they are responsible for their child's social life, their behaviours, their relationships with others, their involvement in the community and their future career. They may try to educate their child in relation to these matters. It is important for parents to believe that their child will have a good job in the future, enjoy a happy social life and exhibit positive behaviours towards other people and the community. Some of the responses given by parents in relation to this theme include the following:

"My child's social life, behaviours and actions are important to me. In addition, her respect status for others, her relationships with her teachers and friends are also important to me. I keep track of these things every day. I ask her the following questions daily: 'How was your day? Did you have any problems, or do you want to share anything with me that happened at school?'" (E28, mother of a girl).

"I think the school should also prepare children for their future life. The school shouldn't only be a place to get a diploma, to get higher marks in national exams, to answer questions without understanding their relation to daily life, to not follow what is happening in one's country, or to not read the news or books. Rather, it should encourage them to have ideas about social events taking place in their country, make them read more books and help them to understand their responsibilities. For example, a girl should know how to cook and how to be a mother, and a boy should know how to look after a family and how to be a father. While they are going to school, they shouldn't neglect these responsibilities. I personally try to prepare my daughter for being a good mother in the future and to be a responsible person in her community" (E5, father of a girl).

“As a parent, I am responsible for preparing my child for her future life, to help her recognise her responsibilities and be respectful of other people and the community” (C11, father of a girl).

#### **7.2.4 Providing a positive home environment for their child**

Providing a positive home environment is another responsibility of the parents. Some of the parents, mostly those in the experimental group, reported a belief that a suitable home environment is important to allow their child to be focused and motivated to learn and study at home. It is also important to eliminate any distractions that may affect the child’s ability to study effectively at home. On this point, the following responses were given by parents:

“We are trying to arrange a silent place for him where he can study and revise his lessons. I think this is my responsibility. Our system at home is arranged according to this” (E15, mother of a boy).

“First of all, I think we need to provide a good environment for my child at home. We are trying to arrange to have guests or to go somewhere at weekends, as we see the benefit of this. We allow limited time for watching television, and we don’t follow any television series. I send my children to sleep at an arranged time. I need to control these things at home” (E10, mother of a girl).

#### **7.2.5 Providing a good education**

Another responsibility of parents in relation to their child’s learning is to provide a good education for their child. Most of the parents reported that they are doing what they can to provide their child with a better education. The main reason for sending a child to a private school and paying relatively high school fees (around 12000 Turkish Lira, which equates to approximately £3500, per year), rather than sending them to a public school is that parents believe private schools will provide a better education. In addition, most of the parents of children from both schools also send their child to an after school course centre, in other words a preparatory school, that also has an additional cost, in order to get help for their child with schoolwork and to prepare them for national exams. This shows that these parents value their child’s learning, even where they did not mention this as being their responsibility in the interviews. Some parents gave the following responses regarding their responsibility for providing their child with a good education:

“We are trying to give all of our support to our child. If he needs after school courses or private lessons, I arrange these them for him. This is what I can do, and I am doing it” (E3, mother of a boy).

“I am giving her all of the support I can. I send her to after school courses or arrange a private tutor” (C17, father of a girl).

“We are doing what we can. We are sending him to a private school; we are also trying to help him with things” (C33, father of a boy).

To conclude this section, parents in both the experimental and control groups considered the following to be their responsibility, in terms of their child’s learning: communication with the school, help or guidance with homework or home studying, preparing children for future life, providing a good home environment and providing a good education. All of the parent value their child’s learning and want to see their child in a positive place in the future, both socially and educationally. To some degree, although some parents are more actively involved than others, all of the parents provide the necessary financial support for their child. Most of these parents communicate with their child’s teachers when they become aware that their child is having problems with their learning or their behaviour. Most of these parents believe that being involved in their child’s learning by helping, controlling or guiding their child’s learning, studying or homework is important in enabling their child to be successful. However, a minority of parents do not agree, and believe that education is the responsibility of the teachers, as they are being paid to provide a better education for the child.

Parents should have beliefs about their responsibilities in relation to helping their child’s learning through communicating with their child’s teachers to get additional support if needed. Most of the parents in the experimental and control groups recognise that they have responsibilities regarding communicating with the school and helping and guiding their child’s learning at home, but some of the parents do not feel that they have this responsibility. The questionnaires result from the previous chapter for parents’ role construction beliefs was also high. Regarding the intervention, parents’ responsibilities in terms of communication and helping and guiding their child’s learning at home are expected to increase by improving their involvement in their child’s learning. Most of these parents already have high role construction beliefs regarding helping their child’s learning at home; however, for the parents who do not, this may change after the intervention.

### **7.3 Parents' self-efficacy in their child's learning**

Parents' self-efficacy in regards to their child's learning is the second component of parental involvement. In the previous chapter, it was found that parents feel more confident about helping with their child's general learning than with their science-related learning, although their self-efficacy was found to be positive. In this section, parents' self-efficacy in regards to their child's both general and science learning will be discussed separately, according to the responses of the parents in the experimental and control groups. The aim is to determine what their actual practice is, and what difficulties they encounter when assisting with their child's learning.

#### **7.3.1 Parents' self-efficacy in general learning**

Parents' self-efficacy with regards to helping their child with general or science-related learning is an important component of parental involvement. Most of the interviewed parents try to help their child's learning directly, but most of them encounter some challenges. According to the experimental and control group parents, these challenges are: their low level of education, their study area, a different education system, their understanding of and knowledge about some of their child's school subjects and their beliefs regarding helping with their child's learning. These challenges will be explained in turn.

Not all the parents from the experimental and control groups have a high level of education. Approximately a quarter of the parents have a low level of education level, and these parents complained about their ability, stating that they are not able to help with any areas of their child's learning. For example, some parents said that they had only completed primary or lower secondary school level education, so felt they couldn't support their child's learning. These parents view themselves as not capable of helping with their child's learning or homework due to their low education level. Some of the responses given by parents from both groups regarding their low education level include the following:

“I don't help with any of my child's homework or learning at home, but I do sit next to her. The only thing that I can encourage her to do is complete her homework. It is not possible for me to help with my child's learning, homework or the questions that she struggles with because I was only able to complete primary school” (E19, mother of a girl).



“We absolutely can’t help with our child’s homework because both of us only graduated from primary school. We aren’t able to help with anything, so we don’t do anything” (E15, mother of a boy).

“I try to control my child’s learning at home, but I can’t be helpful to her. The reason for that is I can’t understand the subjects or homework because of my low level of education. Her father can’t help either, due to his job” (C23, mother of a girl).

“...like I said, I can’t help with my child’s homework because I only completed primary school, but I can help my other son, who is in Year 4” (C8, mother of a boy).

In addition to the low education level of some parents, some of the more educated parents also complained about their ability to help with their child’s learning and homework. More than half of the highly educated parents help with their child’s learning, but this help is limited to certain subjects. In Turkey, school subjects are categorised into four main study areas; these are: quantitative, verbal, equally-weighted and foreign language studies (MEB, 2013). For example, while maths and science fall under the ‘quantitative studies’ category, Turkish studies and social science studies come under verbal studies. Students in Turkey choose their preferred study area during high school (at age 15) and continue to study this area only, only learning about subjects related to the area they have chosen.

The parents who had completed high school or higher education described their confidence, knowledge and skills regarding their specific study areas. In other words, parents who followed a particular track when they were at school felt unable to help their child with school work for a different area of study. Although most of the parents said that they feel capable of helping their children with learning at home, this help is limited to the subjects that are related to the study areas they had chosen for themselves. Most of the highly educated parents had studied the verbal area, and had not learned about any quantitative subjects, such as maths and science, after completing upper secondary school. Some of the interviewed parents (25%), in both groups, said that they are only capable of helping their children in the subjects related to their own study areas, and that they are not able to help with other subjects, related to other areas. Some of the parents’ responses in relation to this point include the following:

“I am a Turkish literature teacher. I can only help with my child’s homework for verbal subjects. I am able to help him with other subjects, but I can’t help him with the current quantitative subjects because they are beyond my understanding and

knowledge. Therefore, I can't help with these subjects, but I can check whether he has completed his homework or not" (E17, mother of a boy).

"I think that helping with my child's learning is one of my responsibilities. I have my child's book in front of me right now and I am reading about my child's Turkish language topic. I will explain this topic to my daughter when she comes home from school. However, I am only capable of helping with my child's verbal subjects, such as Turkish studies, history or geography; I can't help her with science or maths topics" (E10, mother of a girl).

"I can only help her with the topics that I understand. I can't help her with maths and science because I am a history teacher. I help mostly with the verbal subjects. For example, I give her ideas when she writes an essay. I sometimes look at the topics that she studies at school and then try to help her, because I might also struggle to understand her current topics" (E5, father of a girl).

"I am only able to help my child with verbal subjects, because these are the only subjects I studied. However, my husband is capable of helping with the quantitative subjects. Therefore, my child is quite lucky; he can get help with the verbal subjects from me, and help with the quantitative subjects from his father" (C48, mother of a boy).

In Turkey, the education system has changed in recent decades (see Chapter One), and some of the topics and subjects covered by the education system have also changed. Although some of the interviewed parents (20%) from both groups stated that they are not familiar with the new system, particularly some of the topics, as they think that the topics have changed with the new education system. However, most of the topics remain similar, although the teaching methods are different. The parents said that they try to help their children, but most of the time they encounter difficulty due to the different education system. Parents' views regarding the different education system may be an excuse to not be involved in their child's learning, or perhaps indicates a lack of understanding of the new teaching methods. Some of the parents' responses to this point include:

"I only have an upper secondary school degree; I am doing what I can to help. He asks me questions about some of his tests and I try to answer them. Sometimes he may have a practical task and we try to do these at home together. I don't think that I am capable of doing these, though, because we received our education during the old education system, which was different from the current system. Therefore, my help is limited" (E3, mother of a boy).

"I try to help with my daughter's homework where I can, but the education system is different now" (C43, mother of a girl).

"Since the education system is different now I read about the topics beforehand and then try to help with my child's homework" (C53, mother of a boy).

Some other parents, from both groups, stated that they help with their child's learning and homework at home, but that their help is limited to certain topics. Others said that they help most of the time, but sometimes they can't because they don't know the topic, or have forgotten it. One of the highly educated parent highlighted an issue in terms of their skills when helping with their child's learning; they said that they are not able to explain the topics as well as their child's teachers. This issue may be valid for the well-educated parents such as doctors or academics, who may have very detailed knowledge about some of the school topics, but may not transfer this knowledge to their child as the teacher. Furthermore, the information that they try to communicate may be beyond the understanding of their child.

"We are able to explain the topics that my child struggles with, but we can't explain it like her teacher can. I don't help enough with my child's learning at home, or with her homework, because we are working parents and don't have enough time for her. She asks us about her homework or test questions. When we can't help, we direct her to her teachers, where she can get better help" (E14, father of a girl).

"Currently, I can't help with my child's science and maths, because these subjects exceed my understanding, but sometimes my child's father might help with maths. I can only help with verbal subjects like Turkish language or social studies" (C40, mother of a girl).

"We have forgotten topics related to science and maths because we studied them many years ago, but I can help with Turkish language and social studies. I have forgotten the topics that require knowledge, but my child tries to learn about these topics by himself. I don't see myself enough for helping him" (E16, mother of a boy).

A minority of parents from both the experimental and control groups mentioned that helping their child with their homework directly is not a good thing for the child. They believe that doing homework will benefit the child; therefore, if their child is struggling with their homework or with the questions, parents should only show them the way to answer the questions, or encourage them to do additional research on the topics.

"I think my responsibility regarding my child's learning at home and homework is to provide guidance and explain the main ideas of the topics that my child is struggling with, and also to control her at home. I don't think doing the homework or answering the questions directly is beneficial to my child" (E23, father of a girl).

Parents sometimes are unable to help with their child's learning due to their working schedules. Slightly less than half of the parents mentioned that they are not able to spend enough time helping with their child's learning at home due to their working hours. These

parents are too busy to help their child even when they come home, as they might need to do housework, or they might feel tired. Therefore, they do not spend enough time with their child.

“I don’t think I spend enough time with my child at home, because we work all day. I am very tired when I come home. Therefore, I don’t have enough time” (E14, father of a girl).

“I don’t spend enough time with my child because I am very busy, due to my job, but I think he is in good hands (the school)” (C33, father of a boy).

“My partner and I are academics in the faculty of medicine. We are busy most of the time and we are often tired when we come home” (E22, mother of a boy).

The teachers also supported these responses. According to the science teacher, parents are sometimes unable to help with their child’s learning or homework as a result of their busy working schedules. These parents need to rest when they come home, but they also need to do their housework. Therefore, they have little time to spend helping with their child’s learning at home. The teacher stated that:

“Both the fathers and the mothers of most of our students have busy working schedules. They work day and they come home tired. In addition, they need to do the housework and they may also have more than one child. Therefore, they don’t have enough time to spend helping with their child’s learning. This may affect their involvement in their child’s learning” (The science teacher (from the teacher interview data)).

Overall, the experimental and control parents both report certain challenges in helping with their child’s learning in general. The first challenge is their education level. The parents with a lower level of education reported that they feel unable to help with their child’s learning. The second challenge, particularly for more educated parents, is the study areas. More highly educated parents reported that they feel more confident helping with their child’s learning when it is related the areas they themselves studied. Most of the interviewed parents try to help their child’s learning directly, but most of them face some personal challenges. The third challenge is that the education system is different to how it was when the parents were studying, meaning that they might not be familiar with the topics or the homework that their child is studying; however, the different education systems cover similar topics and this issue may just be an excuse for parents not to help their child. The fourth challenge, which mostly relates to the parents who are able to help with their child’s learning, is that they might have forgotten some topics, or may not know

how to explain things to their child as a teacher would. The fifth challenge, reported by some of the parents in the control group, is the belief that helping with their child's learning is not a parent's responsibility, and therefore, they do not help them, yet they show that they value their child's learning by sending them to a private school. Finally, most of the parents reported that they do not have enough time to spend helping with their child's learning due to their busy working schedules.

Regarding the intervention, although all of these difficulties may prevent parents from being involved in their child's learning, introducing a new method that challenges their ideas regarding these issues may help to increase parents' involvement. Explaining to them what to do and supporting them when they have issues might affect their opinions. Although most of them are busy, arranging a convenient time with them for the intervention may also help with their issue regarding finding the time, and this may help to increase the amount time that they spend with their child.

### **7.3.2 Help given by parents with regards to their child's science-related learning**

Parents were asked whether they or not they help with their child's science-related learning. According to the questionnaire data, parents' self-efficacy is lower for in science learning than for general learning. This result is also supported by the interview results. Half of the interviewed parents from both groups said that they do not help with their child's learning for science, which corroborates the questionnaire results. The reasons given for this relate to certain challenges regarding parents' self-efficacy, the same challenges that were reported in relation to parents' self-efficacy with regard to general learning, namely: parents' education level, a different education system, unfamiliar study areas and certain beliefs about helping with their child's learning.

On the other hand, some of the parents said that they are able to help with their child's science-related learning. The majority of these parents help their child by asking them questions and sharing their ideas about scientific topics, and some of them said that they encourage them to do extra research by explaining only the main ideas of the topics. Other parents said that their help is limited to just one of the scientific subjects, such as biology, and one parent said that although they try to help, they sometimes forget the topics.

“Since I am a history teacher, I can't help with my child's learning for science and maths. My child knows that I can't help with these subjects. Therefore, she doesn't

ask me for help with these topics, because she thinks that I can't help her, and she is right" (E5, father of a girl).

"Currently, I can't help my child with either science or with maths, because the topics within these subjects are beyond my understanding. Sometimes her father might help with maths... Neither I nor her father can help my daughter with science" (C40, mother of a girl).

"We have forgotten the topics because we studied many years ago under a different education system. For example, I don't remember learning about electric circuits. I have forgotten the topics like this, which rely on facts" (E16, mother of a boy).

The parents who said that they do help with their child's learning in science use one of four different methods; these are: sharing their ideas with their child about different topics in science, asking questions about the topics, working together or giving examples from their daily life experiences.

"Since I am a biology teacher, I answer the science test questions together with my daughter, but she wants me to do this all the time. She wants to do everything related to her learning together, but I have three children. She tells me that she understands it better this way" (E11, mother of a girl).

"Recently I helped with my child's science learning, it was about elements and their features. I asked her questions about the topic and she answered them. She asked about some elements that she didn't know. Generally, we help her by asking questions to see how much she knows about the topic, and we share our knowledge with each other" (E14, father of a girl).

"For science, if I read about the topics beforehand I can explain them to my child later, but I cannot explain them as well as her teacher. She also explains to me what she knows and then I share what I understand from my reading about the topic. In this way, we share our understandings of the topics with my daughter (E10, mother of a girl)".

"I work as a firefighter. Sometimes, I explain the scientific topics that are related to my job. For example, I explained the windlass to my child, as he may not understand it very well. I explained that it was one of the tools that we use in our job. In addition, I have an interest in electronics. I helped him with electrical circuits and showed him some of their uses in our daily life" (E8, father of a boy).

Parents who try to help with their child's science homework and learning may sometimes encounter difficulties. For instance, some parents commented that they encounter problems every time they try to help, caused by their lack of understanding and knowledge of certain topics. Therefore, to resolve this problem, they take their child to a preparatory school or encourage them to ask their school teachers to get appropriate help with the topics or questions they are struggling with.

“I want to help my child with his science homework, but most of the time we have difficulty because I don’t understand some topics. Therefore, we seek outside help. We send him to a preparatory school. In addition, he has a private tutor for science. We think that we are helping as much as we can in these ways” (E3, mother of a boy).

Some other parents expressed a belief that providing information directly to their child is not a good thing for the child. Rather, they believe that they should direct or guide their child to find information or to answer the questions they are struggling with by themselves. For example, they might encourage them to use the Internet to carry out extra research for the topics or questions they are unsure of.

“I tell my daughter to research the topics that she is struggling with. For example, I explained the main ideas about the velocity and motion topic in science, and she used the Internet to find additional information about the topics she was struggling with” (C58, father of a girl).

“She sometimes brings me science questions that she is struggling with, but I can’t answer them most of the time. However, I suggest possible ways to answer them, or suggest that she do extra research” (C3, mother of a girl).

Some other parents help with subject specific topics only, such as biology. As stated earlier, some parents with verbal studies educational backgrounds see the topics consider biology topics to be more related to the verbal subjects than the quantitative subjects. Therefore, one of the parents said that they are able to help with biology topics, but they are not able to help with chemistry or physics:

“I am only able to help my child with his biology topics. I help him with biology topics, such as organs, the structure of the tongue, red blood cells and white blood cells. I don’t help by explaining the topics to him directly; rather, he says, ‘I have an exam for science, can you ask me questions about these topics?’ I help like this” (E17, mother of a boy).

Overall, most parents, particularly those in the control group, do not help with their child’s learning for science, but these parents value their child’s learning and they expect the necessary help to come from the preparatory school or from their child’s school teachers. On the other hand, parents who are able to help, who were mostly in the experimental group, help with their child’s science learning by asking questions and sharing ideas about the topics, encouraging them to do extra research by explaining the main ideas of the topics, working together or giving examples from their daily life experiences. However, these parents may also encounter some problems, such as limited ability to help with scientific subjects, or forgetting their scientific knowledge. Even

though the results for the experimental and control parents were similar, there was a slight difference between the groups regarding their self-efficacy. However, this difference was not significant enough to affect the intervention results. The intervention provided guidance and instruction to parents regarding how to help with their child's science-related learning at home, which was expected to influence their self-efficacy as well as their involvement.

#### **7.4 Parents' perceptions of invitations from their child and from teachers to help with their child's learning**

Parents' perceptions of invitations from others, specifically teachers and their child, to help with their child's learning is the last construct of parental involvement. Parents receive invitations from their child or their child's teacher regarding their involvement at home. In this section, the responses of parents to these invitations will be explained. In addition, parents' communication with the teachers will be discussed in this section.

##### **7.4.1 Parents' perceptions of invitations from their child to help with their learning**

According to responses given by parents, most of the children ask their parents to help with their learning. Some of these children always ask for help and others only ask when they need help from their parents. In addition to these children, some of the children do not ask for any help from their parents. The following are some of the responses given by parents regarding this theme:

“She asks me questions every day about her homework, such as, ‘Do you know this, or not?’ If I understand the topic, I help her, but if I don’t, I try to remember by revising the topic” (E10, mother of a girl).

“He asks me about questions or topics that he struggles with almost every day. He revises and completes his homework daily after school, and I try to help him” (E8, father of a boy).

“She only wants help when she completes her homework, but we need to encourage her to do this. She comes and says, “Mum, I couldn’t understand this”. I try to help her using different methods, or I tell her to ask her teachers” (C3, mother of a girl).

Some children ask for help from their parents with their questions or homework if they are struggling, or they might ask them because their parents want them to ask. On this point, the parents gave the following responses:

“He doesn’t say us to help him, he only asks about the questions that he is struggling with” (E3, mother of a boy).



“I am a nurse and my child asks me to explain topics related to biology, but he doesn’t ask for help at the moment because they aren’t doing biology topics at school” (E16, mother of a boy).

“My husband is a doctor and my child sometimes asks for explanations of some topics, but she can’t get what she wants because my husband mostly gives detailed information that is beyond her understanding” (C40, mother of a girl).

One of the parents explained that her child does not ask for any help, because their child knows that his parents cannot help with his learning:

“My child doesn’t ask for any help from us because he knows that we are not able to help with his homework or the questions he has” (E15, mother of a boy).

Overall, according to parents, most of the children request help from their parents, either willingly or unwillingly. Some of the children may enjoy working with their parents on their learning. Some others may ask their parents for help because their parents want them to. Some children may not ask their parents for help because they believe that their parents are not able to help, or they do not like working with their parents on their schoolwork. Parents may value their child’s learning, and teachers want them to support their child at home. However, most of the children do not willingly invite their parents to be involved in their learning, due to their past experiences; for example, they may feel pressure from their parents regarding their homework. The intervention thus might help parents and their children to overcome misconceptions about their interactions when working together at home.

#### **7.4.2 Teachers’ request for parents to help with their child’s learning at home**

Parents are also invited by teachers to help with their child’s learning or homework. According to the parents from both groups, teachers ask them to monitor their child’s learning at home. This includes checking whether their child has completed their homework, revised topics and answered daily test questions that the teachers have asked the children to complete. In addition, the teachers do not want parents to help with their child’s homework at home, except the parents who can help, and then only when their child is struggling. Some of the relevant responses here include:

“The teachers generally ask us to not help with our child’s homework. They want the child to do their homework and research alone. However, they want us to

control our child's home learning by checking whether they have completed their homework or not" (E3, mother of a boy).

"The teachers mostly want parents to control their child's learning and to make sure that their child completes their studying or homework. They don't ask parents to sit and work together with their child, but they may encourage the parents who are able to support their child to help when they are struggling. However, most parents don't understand their child's homework or the topics they are studying, and the parents who can understand don't have time to help" (E5, father of a girl, also a teacher).

"They want us to control our child at home by checking what they are doing regarding their homework and the target test questions" (C40, mother of a girl).

"The teachers ask us to follow and control their homework. They also want us to help when they are struggling" (C58, father of a girl).

In addition to these invitations, the teachers are able to contact some of the parents to give them information about their child. This information is mostly about their child's current situation at school, regarding their learning or any unwanted behaviour. For example, some parents reported that the teachers only contact them when their child has problems at school; these problems may be related to the topics, the homework or unwanted behaviour. Some of the responses include:

"The teachers don't want the children to get help with their homework; rather, they say, 'Your child has problems with these topics or subjects, and he needs to improve'. They only warn us, nothing else" (E15, mother of a boy).

"They want us to follow and control our child's learning. They contact us when our child has an issue. For example, they send us a text message when our child hasn't completed his homework or his target test questions. The teachers give out target test questions to be answered by the child, and they want us to check whether our child has completed their target test questions before the deadline" (E8, father of a boy).

"They tell us not to allow our child to spend a lot of time on the internet. They also tell us that our child talks during lessons. Since he is at a transition age, he may sometimes chat with his friends during lessons. They also told us when our child had a fight with his friend" (C8, mother of a boy).

"I regularly talk with her tutor to ask about her situation at school. They warn us when she doesn't study in her lessons, and then we warn her about this" (C11, father of a girl).

Overall, according to parents, the teachers want two things from them. First, they want parents to police their child's learning by checking whether or not they have completed their homework, revised their school topics or answered the daily target test questions

that the teachers want the child to complete. The second is that the teachers do not want parents to help with their child's learning or homework unless they are able to. In addition, the teacher may contact the parents to provide up to date information about their child's situation at school, in relation to their learning or any unwanted behaviours.

Teachers may have some misconceptions regarding what kind of involvement parents should have in their child's home learning. Parents' involvement may not be seen important by teachers except monitoring their child's learning at home, as this is what the teachers want most from the parents. However, if parents are asked to be directly involved in their child's learning, with the teachers informing them about relevant activities and how they can help, this may increase their involvement. This is the aim of the intervention.

#### **7.4.2.1 Parents' communication with teachers**

The purpose of this sub-section is to determine the frequency, the method, the barriers to and the purpose of communication between parents and teachers. This section will be organised to discuss each of these variables in turn.

Approximately half of the parents from both the experimental and control groups said that they try to contact the school or their child's teachers once a month. However, they may do this less regularly. The schools arrange a parent-teacher meeting at the beginning of each term; just under a quarter of the parents said that their only contact with the teachers is during these parent-teacher meetings. However, some of the parents contact the school up to twice a month.

Approximately half of the interviewed parents from both groups said that they prefer to contact the school or the teacher via the telephone calls or text messages only. In addition to phone calls, just under a quarter of the parents prefer to use text messaging to communicate with teachers. However, 40% of the parents prefer face-to-face communication, and meet with teachers at school; 30% of these parents only use this method of communication. Just under a quarter of the parents only communicate with the teacher during the parent-teacher meeting, though parents' responses indicate that almost three quarters of the parents attend the parent-teacher meetings, which happen twice a year, once each term. Interestingly, no parents said that they prefer to use email to communicate with the school or the teachers. However, parents are not encouraged to use

email by the school. Only one parent mentioned email, saying that, “it would be an effective way to communicate with the teacher, but I don’t know the email address of any of my child’s teachers” (E22, mother of a boy).

Three parents said that they are unable to participate in most of the parent-teacher meetings at their child’s school, and gave three reasons for this. Some of them blamed their working hours, saying they are too busy to attend the meetings. Some parents in the experimental group, who do not have a car, mentioned the distance, as the school is far from the city centre and there is no adequate transportation service. One mother said that she has a baby, and so she cannot attend the meetings.

The purpose of communication between parents and teachers is to resolve any issue that a child may be having with their learning and to discuss their current situation at school. The parents said that the teachers want parents to control and track their child’s learning at home. As part of this, parents need to ask questions regarding their child’s learning, especially when they see their child struggling with their homework or having issues with their marks. In this situation, parents can communicate with the teacher to resolve the issues, or to obtain information that is more detailed. On this point, parents gave the following responses:

“If we see that he is getting low marks or is having an issue related to his lessons, we will contact his teacher via telephone to get more information and to resolve the issue” (E15, mother of a boy).

“We exchange information about my child with his teacher when we meet. We talk about any issues he is having and how we can resolve them” (E8, father of a boy).

“...For example, if I see that he is behind target or not interested in his maths topics then I contact his maths teacher to try and understand what problems he is having and how can we help him” (E22, mother of a boy).

“I talk about almost everything related to my child’s school success with his teacher, homework, his behaviour and other matters” (E16, mother of a boy).

The science teacher was also interviewed, and similar results were found regarding the communication between parents and teachers. The teacher described the communication with parents thus:

“Most of the parents attend the parent-teacher meetings that happen twice a year. We talk at the meeting. In addition, most of the parents come to school to ask about their child’s situation between once a month and once every three weeks. We also

frequently talk with most of the parents via the telephone. The main purpose of these communications is to talk about their child's current situation, find out whether their child has completed their homework or not, or to address any unwanted behaviour."

Overall, most of the parents from both groups reported that they use phone calls to communicate with their child's school. The parents in the experimental group generally said that they communicate with teachers when their child receives low marks, to resolve any problems that their child is having at school, or to ask for up to date information about their child. One of the most important policies of private schools is to maintain good communication links between home and the school. These schools want parents to communicate frequently with the teachers, generally via the telephone. However, using email for communication is not something that is promoted by these schools. In the intervention, parents were asked to use email to communicate with their child's teachers, but this may not be possible for parents who generally do not use email in their daily lives. Therefore, the use of email, weekly instructions sheets and phone calls (which were already in use) were added to the intervention.

### **7.5 Parents' views about their child's science-related learning**

Parents' views and attitudes regarding their child's science-related learning were also sought. Most of the parents from both groups said that they think that science is important for their child to learn about. They gave four main reasons for this: that science will help in their daily lives, that it will help them to get better marks in their national exams and that it will help with further science lessons and their future profession. The first reason, which was cited by most of the parents, is the benefit in the daily life. Parents expressed a view that learning about science will help their child in their daily life as they will better understand the circumstances and events that happen around them. For example, some parents stated that some of the current physics topics will help their child understand how to fix electrical issues they may encounter throughout their life, such as needing to change a light bulb. Other parents mentioned the importance of the current biology topics, which they think will help their child to understand how their body works, and what to do if they become ill. Parents gave the following responses in relation to this theme:

"I think it is very important for my child to learn about science, because science is related to our daily life, such as physics or physical events. He will use this knowledge in his life, for example, he will know how to change a light bulb" (E8, father of a boy).

“I think that the current science topics my child studies are not different to the science that features in daily life. Current topics include physics, chemistry and electricity, which he will need to use in his life” (C48, mother of a boy).

“The science topics are important for my child to understand. She may not see the benefit of the “force and movement” topic in her life, but some of the biology topics, specifically the human body, will help her to understand her body and know what to do if she becomes ill” (E28, mother of a girl).

The second reason scientific learning was assigned importance is that parents perceive that it will help their child to get higher marks in the national exam. A few parents mentioned this, and agreed that it is important for their child to understand every subject, as knowledge of each will help them to get better marks in the national exam, which in turn will help them to be accepted into a good upper secondary school. This schooling will then help them get a place at a good university and get a good job.

“I think it will help him in the national exam. My child wants to study medicine and it will help him to do that” (E17, mother of a boy).

“It is important because science is included in the national exams, where he needs to get good marks so he can study at a good university” (E22, mother of a boy).

“It will help her to get higher marks in the national exams” (C17, father of a girl).

The third reason is that it will form the basis for studying further science-related subjects in later education. Parents expressed a belief that their child will build up their scientific knowledge throughout their education. Therefore, each step is important, and skipping one step will make it difficult to succeed at later stages.

“In their further education, they will need to build up their scientific knowledge based on the current topics. I think that understanding the current topics will facilitate this; therefore, current science-related learning is important” (E14, father of a girl).

“I see it as very important and I also tell my child to see it as important, because she will return to similar scientific topics in her further education and the knowledge that she builds will grow each time, which will help her to understand later topics” (C40, mother of a girl).

The fourth reason that parents mentioned is that learning about science will contribute to their child’s future career, as most of the parents wanted a science-related career for their child.

“I think that they will use their current knowledge about science in their future jobs” (E14, father of a girl).

“I think that it may be relevant for his future job. He doesn’t want to study medicine, but I think he would prefer a science or maths related career. He is currently thinking about computer engineering, but I think his decision will change. Therefore, maths and science are important for him” (E22, mother of a boy).

“Since my child’s aim is to be a psychologist, it will help her to achieve this, but science is also important to human life” (C43, mother of a girl).

“I see my child learning about science as being a foundation and practice. It will form the basis of her future role if she chooses a science-related career. It will also help her to decide upon this, according to her interest in science-related topics” (C58, father of a girl).

Overall, parents from both groups said they value the science-related learning of their child. They believe that their current science studies will help their child in their daily life, help them to get better marks in their national exam, help with later science lessons and be beneficial in their future career. Parents’ positive view of science-related learning increased their involvement and the value of the intervention. Furthermore, it may help the child to see that their parents value their science-related learning, and this may affect their attitudes towards science.

## **7.6 Summary**

The first aim of this chapter was to obtain detailed information regarding the experimental and control parents prior to the intervention, in order to investigate the effects of the intervention by comparing the pre and post-results as a baseline to gauge behaviour that may or may not have changed during and following the intervention. The second purpose was to provide further context to the questionnaire responses. The third purpose was to provide further information about the baseline equivalence of the groups, as the groups were formed using matching, meaning some slight differences may exist. A summary of the findings will be presented below:

- Parents may act differently regarding their child’s learning at home. Most parents do interfere with their child’s learning at home, specifically in relation to their homework. These parents value their child’s learning and most of the time try to involve themselves with their child’s learning; this involvement is mostly verbal, such as nagging and warning their child about completing their homework, but some of them guide and support their child directly. Some other parents leave their child to be independent in their learning at home; they do not warn their child about their homework because they believe their child should take

responsibility for their home learning, but they may support their child when they see that their child needs help.

- Parents reported mixed views regarding their child's level of interest towards completing their homework and their enthusiasm to learn at home. Unsurprisingly, some of the children are interested in learning and some of them not. As the children who took part in the study were at a transition age, having begun the change from childhood to early youth, most of these children had interests other than their learning or homework. According to the parents, the attitudes of the teachers, the subjects, their child's friends and the type of homework they have all have an influence over their interest in learning and homework. Furthermore, the child's level of interest can affect their parents' involvement. For example, they may want to take an action towards their child, but this action may be verbally limited. Verbal nagging and warning may have a negative effect on the child; however, the intervention promoted the use of direct interaction with the child's learning, rather than verbal actions. The children may enjoy their parents' interest in their learning, and this may decrease their misconceptions in relation to their parents.
- Regarding what parents actually do to assist with their child's learning, parents from both groups said they support their child's learning by working together with their child, giving moral support and encouragement, or getting external help when they are unable to help themselves. The parents who said they are able to help with their child's learning support their child by helping with the questions that their child struggles with, asking questions about their school topics, explaining the main ideas of homework or questions and reading about the topics beforehand in order to provide better help to their child. On the other hand, the parents who said they are not able to help with their child's learning said they support their child by providing moral support and encouragement, or seeking help from others. Parents said they could get help with their child's learning from school teachers, the internet, their child's siblings, a preparatory school, a private tutor or their neighbours' children. As all the parents indicated that they value their child's learning, they try to do the best they can to provide a better education for their children, both at home and at school.



- Parents from both the control and the experimental groups said that the main responsibilities they recognise that they have with regard to their child's learning are: communication with the school, helping with or guiding homework or home studying, preparing their child for later life, providing a positive environment and providing a good education. All of the parents said that they value their child's learning and want them to have a good future, in both their social and school life. However, some of the control parents said that they believe education is the responsibility of the teachers, as they pay them extra money to provide a better education to their child. Since the parents were matched prior to the intervention, the parents' responses were expected to be similar, although not exactly, as individuals have different views, which is a limitation of this study. Regarding the purpose of this study, parents' beliefs regarding guiding and helping with their child's learning are important, and it was expected that this would increase following the intervention, especially for the parents who do not see this as their responsibility.
- The parents in both the experimental and control groups said they encounter certain challenges in relation helping their child's learning in general. The first challenge is their own level of education. The less educated parents said they feel that they are not able to help with their child's learning. The second challenge, which was especially prevalent in the responses of the more educated parents, pertains to areas of study. The more educated parents said that they feel more confident helping with their child's learning if it related to their own study area. The third challenge is that the education system is now different, and parents may be unfamiliar with particular topics or the type of homework their child receives. However, while the education systems are different, they cover similar topics and so this issue may just be an excuse for parents to not help their child, or it may be that they do not understand the new teaching systems. The fourth challenge, which was mostly highlighted by the parents who are able to help with their child's learning, is that they may have forgotten certain topics, or they may not know how to explain things to their child in the way a teacher would. Finally, most of the parents said they often do not have enough time to spend helping with their child's learning, due to their busy working schedules. Although all these difficulties may prevent parents from participating in their child's learning,

introducing a new method that changes parents' ideas in relation to these issues may help to increase their involvement, for instance explaining to them what to do and supporting them when they have issues. Although most parents are busy, arranging a convenient time with them to carry out the intervention may also help them to overcome issues regarding their lack of time, which may increase the amount of time that they spend with their child.

- Even though the experimental and control parents were matched with each other, there was a slight difference between the groups regarding their self-efficacy in relation to science. However, this difference was not significant enough to affect the intervention results. Most of the parents, particularly those in the control group, do not help with their child's science-related learning, even though they value it; they expect the necessary help to come from the preparatory school or from their child's teachers. On the other hand, parents who are able to help, which was mostly the parents in the experimental group, help with their child's science-related learning by asking questions and sharing ideas about scientific topics, encouraging them to do additional research by explaining the main ideas only, working together or providing examples from daily life. However, these parents may also encounter problems in that their help may be limited to just one of the science subjects, or they may have forgotten some topics. The intervention provided guidance and instruction to the parents regarding how to help with their child's science-related learning at home; this was expected to influence their self-efficacy, as well as their involvement.
- Children may request their parents' help willingly, or unwillingly. Some children might enjoy learning with their parents at home; others may ask their parents to help just because their parents want them to. Other may not ask for their parents' help because they may believe that their parents are not able to help, or they might not like working with their parents on their school studies. Parents may value their child's learning, and teachers might encourage them to support their child in their learning; however, most children do not want their parents to be involved in their learning, due to past experiences. For example, some children said they feel under pressure from their parents in regards their homework. The results in this regard were similar for parents from both the experimental and control groups. The

intervention may help parents and their children to overcome these misconceptions regarding their interactions when working together at home.

- According to parents, the teachers of both the experimental and control groups don't want parents to help with their child's learning or homework, except those who are able to help. They might request that parents control their child's learning by checking whether they have completed their homework, revised school topics or answered the daily target test questions. In addition, the teacher may contact the parents to provide up to date information about their child, which may be related to their child's learning or any unwanted behaviours. The teachers may have some misconceptions regarding what kind of involvement parents should have in their child's learning at home. Parents' involvement may not be appreciated by teachers except monitoring their child's learning at home, as this is mostly what teachers want from the parents. However, if parents are asked to directly involve themselves in their child's learning, and are informed of good activities and the best way to help by the teachers, this may increase their involvement. The aim of the intervention was to achieve this.
- Most of the parents from both groups use phone calls to communicate with their child's school. The parents in the experimental group generally communicate with teachers when their child receives low marks, to resolve any problems their child has at school or to request up to date information about their child. This was the same for the control parents. One of the most important policies of the two private schools is to maintain good communication links between home and the school. These schools want the parents to communicate frequently with teachers, mostly via the telephone. However, using email for communication is not promoted by these schools. In the intervention, parents were asked to use email to communicate with the teachers, but this may not be possible for some parents, for example those who generally do not use email in their daily lives. Therefore, email, weekly instructions sheets and phone calls (which was already in use) were added to the intervention.
- Parents from both groups value their child learning about science. They generally said that they believe that the current science curriculum will help their child in their daily life, help them to get better marks in their national exam, provide a

good foundation for further science lessons and be helpful in their future career. Parents' positive attitudes towards science might increase their involvement and the value they attribute to the intervention. This may also help children to see that their parents value their science-related learning, which may affect their attitudes towards science.

- The experimental and control parents expressed mostly similar views regarding their own involvement, the constructs of parental involvement and their child's science-related learning except for slight differences in relation to their self-efficacy, but this difference is not significant. Some parents' views were expected to change in a positive way as a result of the intervention, where they would increase their involvement in their child's learning.

## **CHAPTER 8: THE RESULTS FOR THE EFFECT OF THE INTERVENTION**

The previous chapter covered the baseline equivalence for both the experimental and control groups of parents, and the prior attitudes of parents who participated in the intervention. This chapter explains the results from the intervention, which is the second part of phase two. The effects of the intervention on parents and children are explained and interpreted by presenting the pre and post-interviews, the children's feedback and some of the teacher interview data, alongside the effect size difference data.

In this chapter, some of the qualitative data collected during and after the intervention is presented, alongside some of the pre-post data results, to determine the effect of the intervention. This section was organised as two sub-sections. The first describes the effect of the intervention on parents, and the second the effect of the intervention on children. The outline of this chapter is:

- The results of the impact on parents:
  - The effects of the intervention on parental involvement in their child's general and science learning, in terms of:
    - Parents' role construction beliefs
    - Parents' self-efficacy
    - Parents' perceptions of invitations from others
  - The effects on parents' attitudes towards science:
    - Parents' overall attitude
    - Parents own attitude
    - Parents' ideas about their child's science learning
- The results of the impact on their children:
  - The effects on children's attitudes towards science

### **8.1 The results of the impact on the parents**

As explained in Chapter Five, when the intervention started there were 22 matched parents in each group; however, four parents dropped out of the experimental group during the intervention process, and pairings from the control group were eliminated to

balance the groups. The data used in this section was obtained from the remaining 18 matched parents. This sub-section covers:

- The effect of the intervention on:
  - Parental involvement and its components
  - Parents' attitudes towards science and its components

### 8.1.1 The results for the effects of the intervention on parental involvement and its components

This section explains the effects of the intervention on parents' involvement in their child's learning in general and in the domain of science. The effects of the intervention on each component are presented individually. In addition, a more detailed description of the effects of the intervention from the qualitative data are presented alongside the quantitative findings.

Tables 8.2 and 8.3 present the standardised (more detail in Chapter Five) pre and post-interventions mean scores for both groups, the pre-intervention differences between the groups, and the pre and post-intervention effect size differences within the groups for parental involvement in their child's general and science learning.

Table 8.2 and Table 8.3: The mean scores and effect size for involvement in general and science learning

Table 8.2: The involvement in general learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	78.2	6.4	+5.8	0.83
	Post	84	7.4		
Control	Pre	78.3	8.5	-0.1	0.01
	Post	78.2	7.1		

Table 8.3: The involvement in science learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	74	8.4	+6.9	0.78
	Post	80.9	9.3		
Control	Pre	73	10	+0.2	0.02
	Post	73.2	7.7		

Since the parents from the experimental and control groups were matched prior the intervention, parental involvement in their child's general learning pre-intervention results were similar for both groups. However, variances in parental involvement in their child's science learning resulted in the mean score being slightly higher for the experimental parents; however, this difference was not important.

In Tables 8.2 and 8.3 show the gains reported by the experimental parent groups in their post-intervention results over the intervention period in terms of both involvement in their child's general and science learning; however, there was no considerable gains or losses

evident in the control parents' scores. The effect size difference for the scores of the experimental group was positive and large (0.83) for their involvement in their child's general learning, and positive and medium (0.78) for their involvement in their child's science learning. These results suggest that the intervention had a positive effect on parental involvement in both child's general learning and science learning. The next sections present the results for the individual components of parental involvement separately.

#### 8.1.1.1 The effect on parents' role construction beliefs

In Tables 8.4 and 8.5, the standardised pre and post-intervention means scores, gain scores, pre-interventions differences between the groups, and the effect size differences between the groups are presented to assess the effect of parents' role construction beliefs regarding their child's learning in general and in science.

Table 8.4 and Table 8.5: The mean scores and effect size differences for parents' role construction beliefs in general and science learning

Table 8.4: Role construction beliefs in general learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	90.9	8	-1.8	0.24
	Post	89.1	7.7		
Control	Pre	88.5	9	-0.5	0.06
	Post	88	8.9		

Table 8.5: Role construction beliefs in science learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	90.6	9.4	-2.8	0.28
	Post	87.8	10.2		
Control	Pre	86.7	8.9	-0.6	0.06
	Post	86.1	8.5		

In Tables 8.4 and 8.5, both the experimental and control groups show a decrease in post-intervention results over the intervention period regarding both role construction beliefs in terms of their child's general and science learning. However, the effect of the size differences for the experimental group were small in magnitude for their role construction beliefs regarding their child's learning in general and in science. Similarly, the differences in the control groups were relatively minor. These results suggest that the effect of the intervention on parents' role construction beliefs in their child's both science and general learning was negatively small.

As explained before, only half the experimental parents were interviewed after the intervention to provide detailed information about their views on the effect of the intervention and their experiences of it post-intervention. According to the pre post-intervention results, negative effects from the intervention on parents' role construction beliefs were found. This result might be because the parents were more optimistic prior

to the intervention. This aspect relates more to what parents believe they should do regarding their child's learning, but may not reflect what they actually do. Therefore, they may have had more positive beliefs before the intervention, but once they put their beliefs into practice they might realise their initial perceptions were unrealistic.

Parents were asked what they believe they should do regarding their child's learning, and both the experimental and control group parents stated that they should communicate with the school, help or guide their child to complete their homework or by engaging in their home studies, prepare their children for their future lives, provide a good home environment, and ensure they receive a good education. The experimental group parents were asked about changes regarding their responsibilities after the intervention. Most of the parents interviewed responded that the intervention had altered some of their ideas, especially with regard to their beliefs about their responsibility for helping their child's learning at home. Parents realised:

- They need to spend more time supporting their child's learning at home
- They should show more interest in their child's learning
- They need to follow and check whether their child understands their school topics or not
- They should understand what their child is learning about at school to be able to help them better at home

Some examples of quotes from parents following the intervention are given below:

"We realised that we should spend more time with our child learning at home and that we should provide her with more support in her learning at home. We also need to follow her lessons daily. My wife shows more interest in this and she started to ask my child daily about what she learned in her lessons at school" (10, Father of a girl).

"I can't understand my child's school topics, but I should show more interest in my child's learning at home by sitting next to her when she studies at home. Then, she can explain me what she is learning at school. I can only encourage her to explain her school topics to me" (27, Mother of a girl).

"I think that some of our ideas about our responsibilities changed after the program. We should follow our child's learning in more detail. We were helping our child's learning, but we should also check whether she understands her school topics or not" (14, Father of a girl).

"I realized that I can provide better help to my child's learning at home when I know what topics my child is learning at school. Therefore, I should sit next to him



when he studies and ask him what topics he is learning at school” (17, Mother of a boy).

However, two of the parents interviewed said that their responsibilities had not changed and one of these parents disagreed with the comment that spending time with their child about their learning is a good thing to do. This parent commented that they should not have a responsibility to ask their child daily about whether they have completed their homework or not, but that they should follow their child’s learning once a week by checking their child’s interest in homework and learning. This parent stated the following:

“I was already helping my child’s learning at home. Therefore, nothing changed after the program. I don’t think the program is beneficial to me because I can’t spend time with my child daily asking whether he completed his homework or not, as I can only check whether he is keen to complete his homework or work on his learning once a week” (22, Mother of a boy).

The other parent who commented that there had been no changes in their perception of their responsibilities gave the following response:

“I don’t think my ideas about my responsibilities changed because I am a teacher and I already know what my child is learning at school, but we experienced a different process in a good way with my child than the normal process during the program.” (2, Mother of a boy).

Overall, the parents were more positive about their responsibilities toward their child’s learning following the intervention. During the intervention, they might have realised that they were not acting in accordance with their ideas and responsibilities. Parents have certain ideas regarding their responsibilities toward their child’s learning, especially in terms of helping them with their learning. The intervention may have prompted them to realise that they should act differently, or that their ideas and responsibilities should change in a positive or a negative way. This may explain the decrease in their post-intervention results.

#### **8.1.1.2 The effect on parents’ self-efficacy in terms of general and science learning**

Tables 8.6 and 8.7 provided two pieces of information regarding parents’ self-efficacy in their child’s learning in general and in science. First, these show the standardised pre and post-interventions and mean scores for the experimental and control groups. Second, they show the effect size differences, highlighting both the differences in the pre-interventions between the groups and the pre and post-intervention differences within the groups.

Table 8.6 and Table 8.7: The mean scores and the effect size for parents' self-efficacy in general and science learning specifically

Table 8.6: Self-efficacy in general learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	77.3	11.8	+4.1	0.42
	Post	81.4	7		
Control	Pre	75.1	11.2	-1.1	0.12
	Post	74	7.6		

Table 8.7: Self-efficacy in science learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	74.6	13.3	+4.6	0.40
	Post	79.2	9.4		
Control	Pre	74.3	11.8	-1.0	0.09
	Post	73.3	8.6		

According to Tables 8.6 and 8.7, the pre-intervention means scores differed for parents' self-efficacy in regard to their child's general learning in favour of the experimental group. However, the difference was not considerable. The pre-intervention results for both groups were similar regarding parents' self-efficacy and their child's science learning.

In Tables 8.6 and 8.7, the experimental group delivered gains in their post-intervention results over the intervention period, focusing on both their self-efficacy and their child's general and science learning. However, the effect size differences of these gains were small in magnitude. Conversely, the control groups reported losses in their post-intervention results over the intervention period. However, the effect sizes of these losses were not considerable. These results may suggest the effect of the intervention on parents' self-efficacy in their child's both general and science learning was positively small.

#### **8.1.1.2.1 Parents' views on self-efficacy**

Prior to the intervention, the majority of the experimental group parents stated that they were helping their child's science learning by asking them for, and sharing ideas about science topics, directing them to complete extra research by giving them information about their topics, working together with them, or giving them examples from their daily life experiences, as explained in Chapter Seven. However, these parents might also have faced some problems, such as their help being limited to science subjects. After the intervention, according to the post-interview results with the experimental group, almost all the parents agreed that when helping their child they identified topics or questions that they struggled with over the course of the intervention. Some parents reported difficulties with certain topics and the majority then sought assistance from the child's siblings or their child's teacher. However, parents did not seek help from teachers by contacting

them directly, rather they spoke to their child to ask for assistance with topics or the questions they were struggling with when at school.

Other parents explained that they could not help their child with certain topics or questions because they had forgotten the topics since they were at school. In addition, some of the parents mentioned that their children did not need help because they believed their child could understand and locate mistakes and revise them independently. Some examples of the responses about the experiences of parents are given below:

“My wife is a teacher; therefore, she helped my child most of the time, but my wife couldn’t help with some questions. Therefore, my daughter asked her older brother these questions” (10, Father of a girl).

“I was able to help her with the topics that I can help with, but I may forget some of the topics. For example, I couldn’t help her with “features of the light” topic because I didn’t remember this topic from my own time” (14, Father of a girl).

“He struggled with one question that I couldn’t help with it. Therefore, I told him to ask his teacher, but I don’t know whether he asked or not” (17, Mother of a boy).

“I was able to help my child with most of the topics except some topics which required specific knowledge, such as “elements”. I struggled with these topics because I had forgotten them, but my child tried to explain these topics to me. We worked together to better understand the topics. I tried to help with the topics that my child was struggling with and he also tried to help me with the topics that I was struggling with. We spent very some good time together” (8, Father of a boy).

“I was able to help him, but he can correct himself when he revises the topics or when determining the questions with which he struggled. He can say that the answer should be like this, or identify when I gave a wrong answer to a question by himself without our help” (22, Mother of a boy).

Overall, although parents said that they helped when their child struggled with questions or topics most of the time, and that they enjoyed working on science together with their child, some of the parents encountered some difficulties. They preferred using their own approaches to resolve these difficulties rather than doing what they were told to do, such as getting help directly from the teacher.

#### ***8.1.1.2.2 Children’s views related to the self-efficacy of their parents***

Children were asked to share their ideas and experiences after the intervention via an open-ended questionnaire. The majority of the children in the experimental group (N=15) completed the questionnaire. These children were asked whether their parents were able to help them when they struggled with topics or questions during the intervention period.

Most of the children responded that their parents were able to help them, and they appreciated this help, for example:

“My parents help me to understand the topics that I struggled on the “Ttnet vitamin” website” (27, Girl).

“My parents asked me questions related to my science topics to help improve my understandings of them” (17, Boy).

“My father helped me by explaining some of the topics that I didn’t understand” (8, Boy).

“My mother explained to me some of the topics by giving examples from daily life and I became very happy” (25, Boy).

One child complained about the intensive working hours of his parents.

“They are very busy. They don’t have enough time to spend with me” (24, Boy).

According to the children’s answers, most of the parents were able to help their child when they struggled with the topics and questions.

Overall, the effect size results for the pre and post-intervention might suggest a small positive effect from the intervention on parents’ self-efficacy when assisting their child’s learning in general and in science specifically. However, prior to the intervention, most of the experimental group parents assisted their child’s science learning by asking them about and sharing ideas about science topics with them directly, directing them to do extra searches offering them key ideas about topics, working together, and giving examples from their daily life and experiences. Over the intervention period, the help extended to the experimental parents was intensive. Therefore, their self-efficacy might have increased as a result of experiencing new ways of helping their child learn, and learning about how to overcome the difficulties their child encounter at home.

#### **8.1.1.3 The effect on parents’ perceptions of invitations from others to help in general and science learning**

Tables 8.8 and 8.9 summarise the descriptive results and the results for the effect on parents’ perceptions of invitations from others to help their child’s general and science learning. The standardised mean scores for both groups, the effect size differences for the pre-interventions results, and the differences within the groups are summarised.

According to Tables 8.8 and 8.9, the pre-intervention mean scores differed for parents' perceptions of invitations from others to help their child's general learning in favour of the control group; although the effect size difference was small in magnitude. The pre-intervention results for both groups were similar regarding their perceptions of invitations from each other to assist their child's science learning.

Tables 8.8 and 8.9: The mean scores and effect size for parents' perceptions of invitations from others

Table 8.8: The perceptions of invitations in general learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	66.8	10.6	+16.0	1.12
	Post	82.8	17.2		
Control	Pre	72.8	14.3	+2.0	0.16
	Post	74.8	10.8		

Table 8.9: The perceptions of invitations in science learning		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	57.2	16.1	+20.1	1.09
	Post	77.3	20.5		
Control	Pre	57.7	18.5	+2.9	0.17
	Post	60.6	15.3		

In Tables 8.8 and 8.9, both the experimental and control groups reported gains in their post-intervention results during the intervention period, specifically regarding their perceptions of invitations from others as a means to help their child's general and science learning. The effect size differences for the gains of the experimental group were positive and large for their perceptions of invitations from others to help both their child's general and science learning. However, the effect size differences for the gain scores of the control group were not considerable. These results suggest that the effect of the intervention on parents' perceptions of invitations from others to assist their child's general and science learning were positive and large. Evaluation of parents' perceptions of invitations from both teachers and their child raised questions about whether the teacher and their child wanted them to support their child's learning or not, but did not include any questions about if the parents asked for help to assist in their child's learning. The main reason for the positive changes is likely to be that parents were asked and guided to assist their child's learning during the intervention period.

### 8.1.2 The results of the effect on parents' overall attitudes towards science and its components

This small section covers the effect of the intervention on parents' overall attitudes towards science, and the components of parents' attitudes towards science, which included parents' own attitudes towards science and parents' ideas about their child's science learning. The post-interview results relate to parents' ideas about their child's science learning are presented alongside the questionnaire results in this section.

The pre and post-intervention results for parents' overall attitudes towards science were calculated by combining the items from the questionnaire. Tables 8.10, 8.11 and 8.12 present the standardised pre and post-interventions mean scores for the groups, the pre-interventions differences between the groups and the pre and post-intervention effect size differences within groups, to reveal parents' overall attitudes towards science and its components.

Table 8.10: The mean scores and effect size for parents' overall attitudes towards science

<b>Table 8.10: Parents' attitudes towards science</b>		<b>Mean</b>	<b>Std. Dev.</b>	<b>Gain</b>	<b>Post vs. Pre</b>
<b>Experimental</b>	<b>Pre</b>	80.7	8.6	<b>+2.3</b>	<b>0.26</b>
	<b>Post</b>	83	8.6		
<b>Control</b>	<b>Pre</b>	77.8	9.7	<b>-3.0</b>	<b>0.36</b>
	<b>Post</b>	74.8	6.6		

Table 8.10 shows the pre-intervention mean scores differed between the groups in favour of the experimental group; however, the effect size difference was small. In Tables 8.11 and 8.12, the pre-intervention mean scores for parents' own attitude towards science and their ideas about their child's science learning between the groups were found to be higher, favouring the experimental group. However, the difference was not considerable in terms of parents' own attitude towards science, although the effect size difference was small for the items of parents' ideas about their child's science learning.

Table 8.11 and Table 8.12: The mean scores and the effect size for parents' own ideas about science and parents' ideas about their child's science learning

<b>Table 8.11: Parents' own ideas about science</b>		<b>Mean</b>	<b>Std. Dev.</b>	<b>Gain</b>	<b>Post vs. Pre</b>
<b>Experimental</b>	<b>Pre</b>	76.9	9.6	<b>+3.2</b>	<b>0.36</b>
	<b>Post</b>	80.1	8.4		
<b>Control</b>	<b>Pre</b>	75.8	10.7	<b>-3.3</b>	<b>0.36</b>
	<b>Post</b>	72.5	7.7		

<b>Table 8.12: Parents' ideas about their child's science learning</b>		<b>Mean</b>	<b>Std. Dev.</b>	<b>Gain</b>	<b>Post vs. Pre</b>
<b>Experimental</b>	<b>Pre</b>	84.4	12.4	<b>+1.4</b>	<b>0.12</b>
	<b>Post</b>	85.8	10.8		
<b>Control</b>	<b>Pre</b>	79.4	14.4	<b>-2.2</b>	<b>0.17</b>
	<b>Post</b>	77.2	10.8		

In Tables 8.10, 8.11 and 8.12, the experimental group showed gains regarding parents' overall attitudes towards science in their post-intervention results over the intervention period and its components. However, the effect size differences for these gains were positively small with regard to parents' attitudes towards science and parents' own ideas

about science. There was no considerable difference in terms of parents' ideas about their child's learning. By contrast, and interestingly, the control groups showed losses in their post-intervention results over the intervention period for all the variables presented in Tables 8.10, 8.11 and 8.12. The effect sizes of these losses were negatively small for parents' overall attitudes towards science and their own attitudes towards science, but there was no considerable change in their ideas about their child's science learning. These results may suggest that the effects of the intervention on parents' attitudes towards science and their own attitudes towards science were positive and small, but that there was no effect on their ideas about their child's science learning.

Prior to the intervention, according to the interview results, the parents from both groups valued their children learning science learning. They believed that their current science learning would assist their child in their daily life, help them to get better marks in their national exams, help them with future science lessons, and contribute to their future jobs, as explained in the previous chapter. Following the intervention, the majority of the experimental parents maintained their beliefs regarding their child's science learning, but some also recognised that their child needed to work harder to be more successful in science.

“Science will help her future life, especially in her education because she will study similar science topics in her further education” (10, Father of a girl).

“Science is a very important subject, but it is hard for my child. Actually, it is one of the hardest subjects for her. Therefore, she needs to get extra help for her science lessons” (27, Father of a girl).

“We need science in our lives. For example, most of the things that we do in the kitchen related to science such as cooking or solutions” (14, Father of a girl).

“I want him to learn in his science lessons and become successful. This will be important in his future. Therefore, I also want him to like science” (17, Mother of a boy).

Other parents mentioned that the intervention had helped them and their child become more knowledgeable and organised about their science learning at home.

“I think he becomes more knowledgeable about his science topics because of our control and following during the intervention. He also became more organised” (8, Father of a boy).

One of the parents added that they expected that science learning would improve their child's intelligence and abstract thinking:

“Science will help him to use his mind in better way by improving his intelligence and abstract thinking about the concepts” (7, Father of a boy).

Overall, the effect of the intervention on parents' overall attitudes towards science and their own attitudes towards science were positive and small, but there was no effect on their ideas about their child's science learning because they already held strong views concerning its importance. The interview results supported these results.

## 8.2 The results of the impact on children

In this sub-section, the effects of the intervention on the children themselves are presented. The parents were matched to the groups, but the children could not be matched. The children's gender differed in each group. This section covers the pre-intervention results, comparing the experimental and control group children and the effect size differences between the pre and post-results to ascertain the effect of the intervention.

### 8.2.1 The results of the effect on children's attitudes towards science

Table 8.13 summarises the descriptive results and the results of the effect on children's attitudes towards science. The standardised mean scores for the groups, the effect size differences for the pre-interventions results, and the differences within the groups are summarised.

Table 8.13: The mean scores and the effect size for children's attitudes towards science

		Children's attitudes towards Science			
		Mean	Std. Dev.	Gain	Post vs. Pre
Experimental	Pre	76.2	11.5	+2.0	0.17
	Post	78.2	12.4		
Control	Pre	73.9	13.6	-0.5	-0.03
	Post	73.4	15.2		

Table 8.13 shows that the experimental groups reported gains in their post-intervention results over the intervention period, although the control group received a very slightly



reduced score for the post-intervention. However, the effect size difference for the score gains of the experimental group were not considerable. These results suggest that the intervention had no effect on children's attitudes towards science.

### **8.3 Conclusion**

This section summarises the impact of the intervention on parents and their child.

- A large positive effect of the intervention on parental involvement in their child's general learning and a medium positive effect of the intervention on parental involvement in their child's science learning were found. Parents were encouraged to work with their child on their science topics on a learning website, by giving them instructions to help to increase parental involvement in both their child's general and science learning.
- The effect of the intervention on parents' role construction beliefs and on their child's science and general learning was negative and small. The parents were more positive about the items and their responsibility for their child's learning prior to the intervention. Parents held certain ideas regarding their responsibility for their child's learning, especially in terms of helping with their learning, but when they tried to help they realised that they felt optimistic and positive, and that their ideas and responsibilities differed from what they had expected. This may explain the decrease in the post-intervention results.
- There was a small positive effect from the intervention on parents' self-efficacy in assisting with their child's learning in general, and in science specifically. After the intervention, the parents realised the extent of their ability to assist their child, and consequently directed more attention toward assisting their child's learning at home. Therefore, their self-efficacy might have increased slightly following the intervention because they had experienced ways of helping their child's learning at home, and explored methods for overcoming the difficulties that their children encounter at home.
- The effect of the intervention on parents' perceptions of invitations from others to help with their child's general and science learning were positive and large. The main reason for the positive changes in their perceptions were because

weekly invitations to parents were sent to help and guide their child's learning during the intervention period.

- The effect of the intervention on parents' attitudes towards science and their own attitudes towards science were positive and small; however, due to their original stance, there was no palpable effect on their ideas about their child's science learning. The interview results support these findings.
- There was no effect of the intervention on children's attitudes towards science, although overall, the intervention did seem to effect parents' involvement in their child's general and science learning.

## **CHAPTER 9: PROCESS EVALUATION OF THE INTERVENTION**

The previous chapter presented the results regarding the effect of the intervention on parent and child variables. In this section, the results for the experimental parents, their children and the science teacher, in terms of the implementation and the experiences of the intervention, will be explained. Observations, weekly feedback forms, post-intervention questionnaire and post interviews were used to collect this data. This data is important to provide detailed information regarding the efficacy and applicability of the intervention.

In this section, first, parents' evaluations of the intervention will be explained, drawing on the weekly feedback forms, post interviews and post questionnaire data. Second, the children's evaluations of the intervention will be presented, drawing on the open-ended questionnaire data. Third, the science teacher's evaluation of the intervention, along with the data collected in the interview with the science teacher, will be discussed. Fourth, the parents' experiences of communicating with the teachers will be discussed, referencing both parents' and teachers' responses to the interview questions. Finally, the experiences and observations of the researcher will be evaluated.

### **9.1 Parents' evaluations of the intervention**

In order to understand parents' experiences and evaluation of the intervention, data was collected using post-intervention questionnaires, weekly feedback forms, a post-interview and observations. In this section, the results obtained using each of these methods will be presented in turn. In addition, parents' views regarding the effect of the intervention on children's interest toward their homework and studying at home will be described. Finally, this section will conclude by presenting parents' views regarding their child's experience of the intervention.

#### **9.1.1 Parents' experiences of the intervention: data collected via post questionnaires**

Parents' experiences of the intervention were sought and the experimental group parents were asked about this in the postquestionnaire. All of the experimental parents completed the questionnaire. In Table 9.1, the questions and the percentage of parents who agreed or disagreed with these questions are presented.

Table 9.1: Parents' responses regarding their experiences of the intervention

Parents' experiences of the intervention		Agree	Disagree	Not sure
1	My child is more enthusiastic about homework.	83	-	17
2	My child is more enthusiastic about science.	83	-	17
3	My child enjoyed my support.	83	-	17
4	I have been able to support my child's learning.	67	17	17
5	The communication with the teacher was very useful.	94	-	6
6	I need to be able to help my child's home learning when they need support.	89	-	11
7	Using email is a good way to communicate with my child's teacher.	50	11	39
8	I enjoyed learning about science topics with my child at home.	89	-	11
9	My child liked explaining science to me.	100	-	-
10	I would like to continue the project by myself.	78	-	22

According to Table 9.1, the majority of the parents agreed that their child enjoyed the intervention and become more enthusiastic towards their homework and science. Most of the parents accepted that they were able to help their child's learning, although some (17%) disagreed with that. Almost all of the parents indicated a belief that communication with teachers is important, but approximately half of the parents do not see using email as a good means of communicating with their child's teacher, reporting that this not work for them. Most of the parents agreed that they should help their child's learning when their child is struggling with their learning or homework. Finally, most of the parents, and their child, enjoyed the intervention and most would like to continue to work with their child following the intervention.

### 9.1.2 Weekly feedback forms results

The parents in the experimental group completed weekly feedback forms during the intervention. The main reason for using these forms was to collect additional information about parents' experiences and the implementation of the intervention. These forms were sent weekly to parents by email and in closed envelopes alongside weekly activities forms. They were asked to complete and return these after each week's activities either via closed envelope sent with their children or email. Therefore, each parent should have completed five feedback forms; however, some of the weekly feedback forms were not completed or were not returned. As most of the parents preferred not to use email and

sent the completed forms with their child, it is possible that the child forgot to pass on the forms, or some parents may not have seen the importance of completing the forms each week. Therefore, some of the forms were missing or returned incomplete. Table 9.2 presents the completion percentage and frequency of the weekly feedback forms.

Table 9.2: The completion percentage of the weekly feedback forms

	<b>N</b>	<b>Percent</b>
Completed	57	63
Returned but not completed	21	23
Not returned	12	13
<b>Total sent</b>	<b>90</b>	

The intervention took place over five weeks, and a total of 90 weekly forms were sent to the parents (five for each parent), and 63% of these forms were completed by the parents. The results from the weekly feedback forms are presented in Table 9.3; these results are based on the total completed forms (N=57).

Table 9.3: The percentage of parents who agreed with the statements provided in the weekly feedback forms

<b>Weekly feedback from the parents</b>		<b>Yes</b>	<b>No</b>	<b>Not sure</b>
<b>1</b>	I enjoyed the website activities.	98	-	2
<b>2</b>	The website activities were informative.	100	-	-
<b>3</b>	The website activities were interesting.	100	-	-
<b>4</b>	They were beneficial for me.	65	-	35
<b>5</b>	My child liked all the activities.	89	-	11
<b>6</b>	The website activities were easy to follow and understand.	9	-	4
<b>7</b>	I was able to help my child with their homework.	67	2	30
<b>8</b>	I learned interesting things about science.	59	9	33
<b>9</b>	The activities provided the information that I need to help my child.	78	-	22
<b>10</b>	I asked the teacher for more help via email.	-	100	-
<b>11</b>	I was able to do what the teacher wanted me to do.	87	2	11
<b>Total</b>		57		

According to Table 9.3, almost all of the parents agreed that the activities on the website were enjoyable, informative and interesting for them. In addition, 65% of the parents found the activities beneficial for them. Although they were not particularly familiar with science topics, 58% of parents reported that they learned some interesting things about

science, and that the animations and activities on the website included interesting visuals and information. The vast majority of the parents stated that their child enjoyed the activities. Most of the parents found the activities easy to follow and understand, and 67% of them were able to help their child. Most of the parents were able to do what the teacher wanted them to do. On the other hand, none of the parents used email to communicate with the teacher to request additional help. According to these results, overall, parents' experiences were positive, and they enjoyed working on the intervention activities with their children. However, encouraging parents' use of email to communicate with the teacher was not successful.

Ten of the experimental parents were interviewed following the intervention. According to the post interview data, all of the interviewed parents reported that they enjoyed the intervention activities. They gave different reasons as to why they enjoyed the activities and the intervention in general. Some of the parents (30%) reported that they enjoyed spending time with their children on their learning. Two parents in particular said that they enjoyed the activities because they were visual and auditory, which helped them and their children to better understand some of the science topics. Two other parents mentioned that feeling responsible for their child's learning through a programme was a different and enjoyable experience. However, one of the parents explained that they felt that the activities were additional work on top of their long working hours. Although this particular parent said that they did not have time to spend with their child both on weekdays and at weekends, they also said that the activities would be enjoyable. Some of the parents' responses regarding their enjoyment of the activities and the intervention in general included:

“My child has used the “vitamin” website before and we enjoyed these website activities because they are visual and auditory. They helped us to better understand the topics” (10, father of a girl).

“I enjoyed spending time and working together with my child on their learning” (17, mother of a boy).

“We experienced a different process than normal regarding our child's learning and it was useful, both for us and our child” (2, mother of a boy).

“We enjoyed it because we helped our child to improve his achievement. Feeling responsible for our child's learning through a programme was a different experience for us and we spent some good time together. Thank you very much for that” (8, father of a boy).

“I felt that it was extra work for me, as I don’t have enough time to spend with my child, even at weekends. I was really busy during the programme timeline. It was difficult for me to arrange extra time, but I would enjoy the activities if I had more time” (22, mother of a boy).

Overall, most of the parents stated that the intervention and science activities were enjoyable for them and that they spent quality time with their children. More importantly, they enjoyed supporting their child’s learning. However, for parents who have busy working schedules, the activities and intervention may be perceived as additional work for them to do at home.

### **9.1.3 Post interview data results: parents’ evaluations of the intervention**

Parents were interviewed after the intervention to discuss their evaluation of and ideas about the benefits and drawbacks of the intervention. Almost all of the interviewed parents gave positive feedback. Parents cited various different benefits of the intervention; these benefits included:

- Helpful for both parents and the child
- Increased the child’s motivation
- Improved the child’s confidence in relation to their homework and studying at home
- The visual and interactive activities were attractive

Most of the parents found the activities and the intervention to be very helpful for them and for their child. Two of the parents said that the intervention and working with their child on the website, following the instructions given by the teacher, were useful and applicable and that the instructions were easy to follow.

“I think that the programme and the activities were good and beneficial both to the children and their parents because they were applicable, easy to follow and to do. We could easily follow the instructions and complete what was required of us to do together with our child” (10, father of a girl).

Three other parents also found the intervention in that they said the intervention increased their child’s motivation towards learning at home. They mentioned specifically that working together with their child on their learning helped to increase their child’s motivation.

“It was good to spend time together with our child learning about science. I think that this increased his motivation towards his learning” (7, father of a boy).

“I don’t have the capacity to evaluate the programme, but I think it helps to motivate both the parents and their child towards learning. I would like to do similar activities for different subjects, like maths, and it would be more effective if it was supported by the school” (14, father of a girl).

In addition, one of the parents mentioned that their child’s confidence in regards to their science learning increased after working on the ‘Ttnet Vitamin’ website with their parent:

“My child’s interest in science increased a little after completing the programme. She didn’t like and was afraid of science when she couldn’t understand science topics, but she has started to spend more time on trying to understand the topics. Her confidence has increased after working on the ‘Vitamin’ website with me. She didn’t like to study science at home, but now she likes to do her science homework and study science at home” (27, mother of a girl).

Three other parents explained that the activities on the ‘Vitamin’ website were attractive to their child because they were visual, interactive and auditory. Children enjoyed studying on the website rather than traditional paper-based home study methods.

“The activities on the website were more attractive to my child than the traditional methods of studying at home, based on paperwork. The activities facilitate the understanding of scientific topics because of the visual and interactive explanations. I think that this type of home learning should be used more generally for all subjects because it helped children to better understand their school topics. Therefore, I think the activities were helpful” (22, mother of a boy).

“The activities were attractive to my child. He answered the test questions interactively using the computer. He got points for each question that he answered and he enjoyed that” (17, mother of a boy).

Although the overall views of parents were positive, they also mentioned some drawbacks of the intervention. Two parents considered the explanations given with the activities to be very brief, where the test questions were very detailed. They said that they easily understood the activities, but they had some difficulties with the questions because they contained very detailed information that was not explained in the activities, which only provided brief information to help the children revise their school topics. Therefore, parents may find the explanation provided with the activities very brief. In addition, one of the parents was worried that their child would become too dependent on their help, and was afraid that their son would always ask to work together at home; this parent said that it would not be possible for them to always work with their child on their learning.

“The topics were explained briefly in the activities, but the test questions were very detailed. It was good when we were watching and completing the activities, but when we came to the questions, everything changed because they were detailed and my child struggled to answer them. I was also helpless because they referred to



information that I didn't know and wasn't covered in the activities. Struggling with the questions may affect my child's motivation" (25, mother of a boy).

"I found the activities were explained very easily, but I am not sure whether it was suitable for the understanding level of the children or not. I think this might be the only drawback" (22, mother of a boy).

"Regarding a drawback of the programme, I wonder whether our child will always want to study with his parents, because we wouldn't always be with him. It won't be a good thing if he only wants to study at home with his parents" (17, mother of a boy).

Overall, according to parents' experiences of the intervention, the weekly feedback forms and post interview results, the intervention and the website activities were beneficial and enjoyable for the parents, even though some of the feedback forms were not completed. The majority of the parents and their children enjoyed the intervention and the activities. Parents mainly enjoyed the visual and interactive activities, which they said helped their child to better understand science topics. However, the information that was given alongside the activities on the website may not be sufficient to impart a detailed understanding of the topics and enable the child to answer the test questions that follow. Children's motivation and encouragement may increase alongside the interest that parents show in their child's learning while using the 'Ttnet Vitamin' website. However, this might cause some children to want to work with their parents all the time at home, which may not be possible for all parents. This therefore may be an issue for children who are too dependent on their parents.

### **9.1.3 Parents' views about the effect of the intervention on children's interest in their homework**

The parents' responses to the post interview indicate parents' views regarding the effect of the intervention on their child's interest towards their homework. Almost all the interviewed parents (90%) said that the intervention was beneficial to their child, except one parent who said that there was no change in their child. According to most parents (60%), their child's interest in their science homework increased. In addition, the website helped their child to better understand their school topics through visual and interactive activities. According to some parents (30%), their child enjoys studying using computers and the internet; therefore, their child showed more interest in the intervention and enjoyed the activities. Some parents (20%) mentioned that their child received higher marks in their exams and they attributed this improvement to the intervention. One parent reported that his child's confidence in completing homework and studying at home

improved because of the interest that he showed in his child's learning at home, which the intervention provided.

"My child generally makes a lot of mistakes in the science practice exams, but she made just three or four mistakes in her last science exam. This was the first time she had made fewer mistakes. This is a very good result for her and I attribute this to the programme. In addition, the website helped her to better understand science topics and she enjoyed doing her science homework during the programme" (27, mother of a girl).

"He enjoyed doing his homework and studying at home. His confidence and enjoyment in relation to homework improved as we showed more interest in his learning by working together. His science grades also improved because of our involvement in the programme. Therefore, the programme was very beneficial" (8, father of a boy).

"Her interest in studying science at home increased because of the visual activities on the websites" (14, father of a girl).

"His first exam result in science was not good, but he got a better mark on the second exam. I think it may be because of this programme" (25, mother of a son).

"Generally, my child likes to study using the computer and the internet. If we let him, he will always study on the internet. He enjoyed completing the science activities because he could use the computer and the internet. However, I don't think the programme made any changes to my child because he already liked science and working on the computer" (22, mother of a boy).

Overall, according to parents, the intervention was beneficial to their child's science-related learning. Some parents reported an increased interest in science. For the children who like to use the internet and computer, their interest towards their science-related learning increased. However, this increase in interest may be because of the use of computers and the internet, rather than the intervention itself.

#### **9.1.5 Parents' views about their child's enjoyment of working with their parents**

Most of the parents reported that they think their child enjoyed spending time with their parents on their learning. However, two of the interviewed parents did not think that their child enjoyed working together. According to these parents, one of these children prefers to study alone, and another child does not like to study at home because she believes that learning should take place at school, not at home. One of the interviewed parents was not sure how much their child enjoyed working together or working with the computer. However, all other parents believed that their child enjoyed the activities and spending time with their parents on their school topics. Some of the parents' responses regarding this point included:

“She enjoys spending time with me on her learning, but we don’t have enough time for her. She likes to sit near to me when she studies. She then starts to explain the school topics to me; she likes to explain them to me when she has understood them” (27, mother of a girl).

“He enjoys the interest that we show in his learning when we work together” (8, father of a boy).

“He doesn’t like to spend too much time with us discussing his school topics because he prefers to work by himself, and he enjoys this” (2, mother of a boy).

“She doesn’t like it because she prefers to learn about the topics in lessons at school rather than at home, and she doesn’t want to do homework. She still has this attitude, and we are trying to change it” (14, father of a girl).

“He enjoyed the programme activities, but I am not sure whether he enjoyed working together with me, or working with the computer” (22, mother of a boy).

## **9.2 Children’s evaluations of the intervention**

This section will summarise the children’s evaluations and their enjoyment of the intervention, referencing the responses to the open-ended questions asked after the intervention, where most of the children (N=15) who participated in the intervention were questioned. This section will focus on children’s enjoyment of the intervention and related activities.

### **9.2.1 Children’s enjoyment of the programme**

Following the intervention, the children were asked about their enjoyment of the intervention and related activities. Most of the children said that they enjoyed the intervention and the activities. They reported that they enjoyed the programme because the activities were interesting and informative, used animations, helped them to understand the topics better, and that it was enjoyable to work with their parents on their learning.

“I was very pleased to do the science activities and answer the questions with my parents. I think the programme was nice and useful. It helped me to re-register to the website and the website helped me to study at home in a fun way. Thank you” (14, girl).

“I enjoyed it. The website explains each topic with animations” (27, girl).

“I liked it because the activities were nice and informative” (8, boy).

“I enjoyed it because it helped me to understand the topics that I struggle with at school” (25, boy).

“I enjoyed the programme because it helped me to be more successful and to spend more time with my family” (10, girl).

However, some of the children (30%) did not like the test questions that followed the explanations of the topics. The main reason for not liking some of the questions was that these questions required some calculations, which some of the children had difficulty with. In addition, one of the children mentioned that the longer activities were boring.

“I likes it, but I found the questions that needed calculation hard” (17, boy).

“Actually, I didn’t like it because some of the test questions needed calculations and I couldn’t answer these questions without a pen and paper. In addition, the test questions included information that wasn’t covered in the explanations” (7, boy).

“I enjoyed most of the activities, but some of them were very long, so I didn’t like them” (2, boy).

Overall, almost all the children enjoyed the intervention. The main reasons the children gave for enjoying the intervention were that they saw the benefit for their science learning, and they appreciated the non-traditional way of studying and the interest of their parents towards their learning. In addition, most of the children stated that they wish to continue the intervention because they enjoyed learning about science in a different way and their parents showing an interest in their learning. The following are some of the responses to the question of whether the children want to continue with the intervention or not:

“I would like to do science activities with my parents on the ‘Vitamin’ website weekly” (14, girl)

“I want to continue to learn more about science” (17, boy).

“I want to continue because it helps me to understand the topics more easily” (24, boy).

In light of these responses, it can be said that children’s views regarding their enjoyment of the intervention and the activities were similar to their parents’ views of their child’s enjoyment of the intervention.

### **9.3 The science teacher’s view of the intervention**

The science teacher who taught the children in the experimental group was interviewed after the intervention. According to the teacher, the children enjoy working with their parents on their learning at home and the children who participated in the intervention

enjoyed the intervention and working with their parents, and expressed their enjoyment at school.

The children who completed the activities with their parents said that they had studied with their father or mother at home. These children were very happy. They enjoyed working with their parents on their schoolwork at home. These children were also more successful in the science topics than the children whose parents didn't help; they said, "I know this topic because I studied it with my father or my mother". They expressed their happiness at school".

In addition, the teacher evaluated the intervention. The teacher considered the intervention to have been beneficial and useful. According to teacher, the intervention helped some of the children to improve both their achievement and their self-confidence in science. The teacher referenced the exam results of the children in support of this view.

"I think the programme was useful in involving parents in their child's science-related learning. The achievement and self-confidence of some children increased due to the involvement of their parents in their learning. In addition, the children's participation in class increased because of their improved self-confidence. Studying at home with their parents helped these children to build up their self-confidence, which increased their participation in class. I think that working with their parents and explaining the science topics to their parents via the website may also help to improve their achievement in science."

However, the teacher also mentioned the difficulties involved for the parents participating in the intervention. Their children may benefit from their help at home, but most of the parents do not have enough time to spend with their children because of their working hours and availability at home.

"I think this programme will increase the achievement of children in science if the parents do what they are asked to do at home every week, but it is very difficult for them to continue with the programme because of their working hours and their availability at home".

Overall, according to the science teacher, the children benefitted from working with their parents at home through using the website, and the achievement and the self-confidence of some of the children improved following the intervention. However, it was difficult for parents to participate in the intervention because of their busy working schedules and availability at home. This issue was anticipated prior to the intervention and the intervention was arranged in consideration of this issue, where parents requested to spend approximately 40 minutes per week on the intervention.

#### **9.4 Parents' communications with the science teacher**

In this subsection, the effect of the intervention on parents' communications with the teacher will be discussed. In order to understand the effects of the invention on the communication between parents and the teacher, the observations of the researcher during the intervention, the post interview and the teacher's views will be presented.

One of the main purposes of the intervention was to increase the communication between the teacher and parents. Parents requested to communicate with their child's science teacher during the intervention if they encountered any issues with the activities or the test questions. However, according to their responses, most of the parents preferred not to communicate with the science teacher during the intervention. The main reason given for not communicating with the teacher was that most of the parents did not feel the need to, although some parents did encounter some problems during the intervention. Some of the responses given by the interviewed parents regarding communication with the teacher include the following:

"Since my job is related to science, we didn't need any help. However, if it had been a different subject, I would communicate with the teacher to get help. I was able to help with the activities and the questions; thus, we didn't need to communicate with the teacher" (2, mother of a boy).

"We didn't call the teacher because we didn't have any problem with the topics. I was able to help my child when he had problems" (22, mother of a boy).

"We didn't talk about the programme with the teacher, but we talked about some other things" (25, mother of a son).

"We didn't need to communicate with the teacher. We followed the instructions for the activities without any problems" (7, father of a boy).

One of the parents gave a different reason for not communicating with the teacher, which was that he did not want to disturb the teacher out of their working hours. Therefore, he did not communicate with teacher even though he needed help from the teacher. This parent stated that:

"We didn't communicate with the teacher. Since we completed the activities after my working hours in the evening, we didn't want to disturb the teacher at this time because it was outside of their working hours. We could have called the teacher, because we did have some difficulties with some of the topics" (8, father of a boy).

Although parents were asked to use email to communicate with the teacher when they encountered any difficulties with the activities or the test questions, parents did not use email to communicate. In addition, almost all of the parents stated that if they needed to

communicate with the teacher, they would prefer not to use email. The main reason given for not wanting to use email was that parents believe that getting a reply to an email would take some time. Therefore, they prefer to use phone calls, to which they can get an instant response, as it is a policy of some private schools in Turkey that parents can call the school and teachers outside of school hours. In addition, parents would prefer to hear the voice of the teacher if they needed to get help from them. Some of the responses given by the parents regarding the method of communication with the teacher included:

“I would like to communicate via email, but I prefer a phone call or meeting face-to-face. It is important for me to hear the voice of the teacher when I communicate with them” (10, father of a girl).

“I prefer a phone call or face-to-face meeting when communicating with the teacher than communicating by email” (2, mother of a boy).

“I would prefer not to use email because it would take a long time to get a response. A phone call is faster and more effective” (7, father of a boy).

The science teacher provided a different reason to the parents for not using email. According to the teacher, parents do not have time to use email when they come home, due to their intensive working hours, but they do have time to make a phone call. The teacher commented the following:

“They prefer not to use email because of their busy working hours. They come home very tired and need to do some other things at home. I think the main reason is because they have technological devices all around them. They are busy at their work and they are also busy at their home after the work, so they don’t have time for this”.

According to the teacher, the manner of parents’ communication did not change after the intervention. The teacher commented that:

We always say to parents to let us know if their child is struggling with any topics or questions. All of the parents have my phone number and I tell them to call me whenever they want, but they generally don’t call me if their child is struggling with topics or questions. However, they call me at least once a month to ask about their child’s situation at school, but they don’t call me for help, except for two or three parents who asked for help when their child was struggling with questions during the intervention”.

In addition to these results, the data relating to parents’ experiences of the intervention and the weekly feedback forms also indicated that none of the parents used email to communicate with the teacher during the intervention, although half of the parents said that using email to communicate with the teacher is a good idea.

According to the observation results collected throughout the intervention, most of the parents preferred not to communicate with the teacher when their child was struggling with topics or questions, even though some of them could not help their child. Some of the parents contacted the teacher three times in total regarding some of the questions that neither the parents nor their child were able to answer, and the teacher explained these questions to the child over the phone.

Overall, according to these results, it can be said that communications between the parents and the science teacher did not change following the intervention, and it may be difficult to increase the level of communication between parent and teacher. Most of the parents did not request any help from the teacher during the intervention, and one of the parents who needed help from the teacher hesitated to ask for this help. Only three parents instructed their child to ask their teacher about questions they were struggling with, and these children did ask the teacher. However, two parents contacted the teacher three times in total via telephone to ask about questions that they did not understand, and they received the help they needed.

### **9.5 Results of the observations and overall evaluation**

Observations were carried out during intervention period, with two main purposes. The first purpose was to record the experiences and reflections of the researcher prior to, during and after the intervention. The second purpose was to record the parents' and children's experiences of the intervention during eight home visits made during the intervention.

The main findings in relation to the first purpose are:

- The involvement of parents in the weekly activities for the intervention was not easy. Parents were contacted frequently to remind them of the weekly activities and the deadline for these. Most of the parents were not able to complete the activities before the deadline. Some of the parents completed two weekly activities in one week and some completed the last activity after the intervention had finished. The main reason for this was that parents did not have enough time for the activities, and struggled to find the time to complete them. However, the intervention was arranged to take approximately 40 minutes per week in order to



suit parents' availability; however, there were some scheduling issues for some of the parents.

- Both mothers and fathers participated in the intervention at different times, according to their availability and working schedules.
- During the intervention, periodic text messages and emails were sent to parents to remind them of the activities and deadlines for the week.

The main findings from the home visits are:

- Eight home visits were arranged during the intervention period. Most of these visits were arranged with the parents who experienced some difficulties with the activities, which was established via the feedback forms. These difficulties included: website related issues; the child could not explain or summarize the topics of the activities, parents could not help their child's learning; or parents did not have time for the activities.
- Most of the parents did not have any problems accessing the activities on the website. Their child helped them to easily locate the activities.
- The children were excited when explaining the topics and how they answered the questions to their parents. For example, one of the children spoke happily and quickly and wanted to show his parent how he had answered a question.
- Some of the parents corrected their child's explanations, or helped them to explain something more clearly, giving some additional examples from daily life or asking for more detail about the topics. The children enjoyed this, agreeing with their parent.
- The activities took approximately 30-45 minutes to complete, which was close to the expected duration for each weekly activity.
- The parents asked their child to revise their answers to the questions that they were able to help with.
- The parents and their children enjoyed the activities, and the children's siblings also observed the activities. For example, both parents and siblings and watched the animations and completed the activities together. Both parents encouraged their child when they were answering the questions, giving comments like, "You can do this," or, "Think carefully about what they have asked you". The appearance was of families solving puzzles together,

and they were happy when the answers were correct. They had reactions such as, “Yes, it is correct. Bravo...”

- Some of the children revised their incorrect answers and were able to easily see their mistakes. Their parents said to them, “You should be careful when you answer the questions.”

Overall, the children and their parents enjoyed being involved in the intervention, and were able to experience a new process for science-related learning. However, parents’ participation in the intervention was very difficult, even though there was a benefit to them and their child. The researcher was in regular contact with the parents throughout the intervention period, to make sure that they completed the activities at the right time and did not skip them. The most important reason for this was parents’ busy working schedules and availability at home; they mostly come home very tired and they have other responsibilities at home that they prioritise over spending time helping with their child’s learning.

## **9.6 Summary of the process evaluation results**

- According to parents’ experiences of the intervention, weekly feedback forms and post interview data, the intervention and the website activities were helpful and enjoyable for most of the parents. The majority of the parents and their child enjoyed the intervention and the activities. Parents mostly enjoyed the visual and interactive activities, which they said helped their child to understand their science topics better. However, the information that was provided alongside the activities on the website may not be enough to impart a detailed understanding of the topics and to enable the child to answer the test questions that follow. Children’s motivation and encouragement might increase alongside the interest that parents show in their child’s learning when using the ‘Vitamin’ website.
- According to parents, their child’s interest in their science-related learning and homework increased during the intervention. In addition, the website helped their child to understand their school topics through the visual and interactive activities better. According to some parents, their child enjoyed studying using the computer and the internet; therefore, their child showed more interest in the intervention and enjoyed the related activities. This implies an important

recommendation for the school, as the school currently do not encourage children to use the internet, due to its possible negative effects. Some parents mentioned that their child received higher marks in their exams, and they attributed this improvement to the intervention. One of the parents said that his child's confidence when completing homework and studying at home improved because of the interest that he had shown in his child's learning at home, which the intervention provided.

- Almost all of the children enjoyed the intervention. The main reasons the children gave for enjoying the intervention were that they saw the benefit of it on their learning, they enjoyed the non-traditional method of studying at home and appreciated the interest of their parents in their learning. The observations also supported this. In addition, most of the children stated that they wish to continue with the intervention because they enjoyed learning about science in a different way and having their parents show an interest in their learning.
- According to the science teacher, the children benefitted from working with their parents at home using the website. The achievement levels and the self-confidence of some of the children improved following the intervention. The teacher gave an example of two children who had low exam and test results prior to the intervention, which increased unexpectedly following the intervention. However, parents' participation in the intervention was difficult due to their busy working schedules and availability at home.
- According to only post interview results, the communication between the parents and the science teacher did not change. Most of the parents did not need help from the teacher during the intervention, although some parents experienced some problems. One of the parents who needed help from the teacher was reluctant to seek help from the teacher. Some other parents just instructed their child to ask their teacher about the questions they were struggling with at school. However, two parents contacted the teacher three times in total to ask about questions that they did not understand and needed help with, although they did this over the phone.
- The observation results show that the children and their parents enjoyed being involved in the intervention. They experienced a different process for science-

related learning. However, parents' participation in the intervention was very difficult, even though there was a benefit for them and their children. The researcher was in regular contact with the parents throughout the intervention period to make sure that parents completed the activities at the right time. The intervention will provide benefits to parents and their children, but implementation of the intervention and control of parents requires extensive work and time. Therefore, involving parents in their child's learning is difficult, despite the associated benefit.

## CHAPTER 10: DISCUSSIONS AND IMPLICATIONS

The first aim of this study was to identify the extent of parental involvement in their children's general and science learning, and the relationship between the level of involvement and their backgrounds. The second and main purpose of the study was to investigate whether the intervention had any effect on the components of parental involvement and parents' attitudes towards science learning.

This chapter discusses the results regarding stage one and two of the study in order to answer the research questions. Firstly, the findings regarding stage one's research questions (the first and second research questions) are discussed. Secondly, the findings about stage two's research questions (third and fourth research questions) are explained and interpreted. Thirdly, the evaluation results of the intervention by parents, children, teacher and researcher are elucidated and discussed. This chapter ends by presenting the limitations, implications and recommendations of this research.

### 10.1 Discussion of Stage One results

The first and second research questions in Stage One are explained in this section. The results from the general parental involvement questionnaires were used to find out the extent of parental involvement and its components (e.g parents' role construction) as well as parents' and children's attitudes towards science. The data was collected from parents who send their child to either a public, or a private school.

Research Question 1 (Stage One): *To what extent do parents report being involved with their child's learning in science and more generally? To what extent do parental involvement and its components vary according to background (parents' gender, child's gender, career in science, school type and family education level)?*

This section discusses the key findings that emerged and were reported in full in Chapter Six. Therefore, this section is presented in the following order: parental involvement, role construction beliefs, self-efficacy, perceptions of invitations from teachers and their child in order to help their child's general and science learning, their attitude towards science and children's attitudes towards science.

### **10.1.1 Parental Involvement in general and science learning**

The findings of this study show that parents' involvement in their child's general (66%) and science learning (60%) is positive, as parents mostly agreed with the questions about parental involvement. However, the involvement of parents in general learning were slightly higher than in science learning. According to the results, parents reported that they were involved in their child's learning. To find out how parents were actually involved in their child's learning, interviews were conducted with some parents who send their children to private schools. According to the interview results, parents may act differently regarding their child's learning at home. Most parents do interfere with their child's learning at home, specifically in relation to their homework. These parents value their child's learning and most of the time try to involve themselves with their child's learning; this involvement is mostly verbal, such as pushing and warning their child about completing their homework, but some of them guide and support their child directly. Some other parents let their child be independent in their learning at home; they do not pressure their child to do homework, because they believe the child should take responsibility for his or her home learning, but they may support their child when they see that their child needs help.

Working together with their child, giving moral support and encouragement, or getting external help when they are unable to help themselves, were the ways that parents reported being involved in their child's learning. The parents who said they are able to help with their child's learning support their child by helping with the questions that their child struggles with, asking questions about their school topics, explaining the homework, or questions, or by reading about the topics beforehand, in order to better assist the child. On the other hand, the parents who said they are not able to directly help with their child's learning said they support their child by providing moral support and encouragement, or seeking help from others, such as school teachers, the internet, the child's siblings, a preparatory school, a private tutor, or the neighbours' children. As all the parents indicated that they value their child's learning, they try to do the best in order to provide a better education for their children, both at home and at school.

As stated by Desforjes&Abouchaar (2003), parental involvement takes many forms, but the most effective form is the at-home good parenting that includes directly assisting with the child's homework. However, according to the interview and open-ended questions of

this study, the majority of parents do not get involved in their child's learning in this way. Even well-educated parents have some difficulties, as is explained in the self-efficacy section below. On the other hand, there are parents who are pushing and nagging their children to complete their homework at home. This causes some issues for children who state that they do not want their parents to pressure them to do their homework (as we saw in children's statements about their parents' involvement in Chapter Six). Since all parents value their children's learning, each of them has adopted a way they believe will help their child's school success, but sometimes this may not work as they expect.

Regarding the parents' background, the results demonstrated that parents who were better educated were more likely to be involved in their child's general learning than those who had a lower education level. These results are consistent with the literature (Koonce and Harper, 2005; Carlisle et al., 2005). Koonce and Harper (2005) stated that parents' income and level of education affect their involvement in their children's learning. Carlisle et al (2005) and Walker et. al. (2005) explained that less educated parents become less involved than well-educated parents, because these parents may feel that they are not able to help their child's learning. However, some studies could not find a relationship between educational level and involvement (such as Fan & Chen, 2001).

The interview results supported the findings regarding education level, where the less educated parents stated that they were not capable of helping their child's learning, because of their level of education. However, they did feel that they should help their child's education, although they felt unable to do it. Actually, parents did feel that they were unable to help their child's learning and, because of this, they did not get involved in their child's learning. Rather, they tried to do other things to help their child's learning, such as send their child to a preparatory school, give moral support, or providing a favourable home environment.

In addition, parents who had a science-based career claimed to be more involved in their child's learning, than those who did not have a science-based career. Parents with science related jobs might also be the better educated parents. However, the results did not show any connection between gender and school groups. Although school types were related to parents' income, as claimed by some studies that argue that parental income affects parental involvement (Koonce and Harper, 2005), the results of the study regarding income were inconsistent with the literature.

### **10.1.2 Parents' role construction beliefs regarding their child's learning**

Parent's role construction relates to parents' beliefs about themselves, in terms of helping their children's learning, and arranging their behaviour in accordance with these beliefs. These include what they should do for their children's learning at home and what responsibilities should they have regarding their children's learning (Hoover-Dempsey et. al., 2005). As an important construct of parental involvement, the role construction beliefs of parents were very high relative to both their child's general (92%) and science learning (93%). The high scores might be explained by the fact that almost all the parents valued their child's education and believed they should be responsible for overseeing it. Parents' high role construction beliefs are important for their involvement, because they lead to greater involvement in the child's learning (Hoover-Dempsey and Sandler, 1997). The results of this study are aligned with some others studies in the literature. Tekin (2008) investigated Turkish parents' motivational beliefs regarding their involvement in their children's learning and he founded that Turkish parents' role construction beliefs were high (81%). In addition, Deslandes and Bertrand (2005) and Anderson and Minke (2007) investigated the role construction beliefs of parents in their children's learning and they reported that the role construction beliefs of parents were very high.

According to the interview results, parents held positive beliefs regarding their responsibilities. The most reported responsibilities were communication with the school, helping with or guiding homework, preparing their child for later life, providing a good home environment, or providing a good education. All the parents who were interviewed value the education of their children and want their child to have a good future, in both their social and school life. Although parents have these high beliefs regarding their responsibilities, most of them do not turn these beliefs to involvement in their child's learning, because they hold more positive beliefs about their responsibilities than their reported involvement. These positive role construction beliefs of parents were mostly related to the additional actions towards their involvement, but they were not related to directly helping their child's learning, which affected their child's learning (Desforjes & Abouchaar, 2003). The main reason for this may be that more action needs to be taken than simply holding positive beliefs concerning their own responsibilities.

On the other hand, according to the results, parents' beliefs regarding their role construction were largely similar, despite the background variables, including education



levels and school groups, even though there were some small effect size differences for some variables (see Table 6.3 and Table 6.4) There are mixed results regarding parents' backgrounds and their role construction beliefs. Although Sheldon (2002) reported a relationship between education level and involvement, Tekin (2008) did not find any such relationship.

### **10.1.3 Parents' self-efficacy in their child's learning**

The results showed that parents' self-efficacy, which was the second important construct for parental involvement (Hoover-Dempsey et. al., 2005) was also positive for both types of learning. Parents' self-efficacy in helping their child's general learning (67%) was slightly higher than their self-efficacy in science learning (62%). This result is consistent with some research in the literature. For example, Tekin (2008) found that the self-efficacy of Turkish parents was positive with 2.77 out of 4.00 (%69). Besides, Deslandes and Bertrand (2005) and Anderson and Minke (2007) reported high parents' self-efficacy level in their studies.

Parental self-efficacy in helping their child's learning directly related to their abilities, confidence, knowledge and skills in assisting their child's learning. However, most of the parents tried to help their child's learning, but they faced some difficulties and these affected their efficacy in helping their child's learning. Interview results revealed these difficulties. Parents expressed that their education level, study areas, the education system, their having forgotten the school topics, lack of responsibility beliefs, or lack of time were the difficulties that they encountered. These difficulties decreased their confidence, knowledge and skills towards involvement. Revealing the most important difficulties is important to better understand the limited factors that influence parents' involvement. Finding effective ways to eliminate these difficulties is also important in increasing parental involvement.

In this study, children mostly needed help from their parents regarding their homework or questions about the school topics. Therefore, parents can be divided into two groups: the parents who can directly help their child's learning and the others who are not able to help directly. The parents who are able to help assist their child with their homework, or the questions that their child struggles with, asking questions about the topics, explaining the main idea of the homework, explaining the questions or reading about the topics beforehand to better help their child, have high self-efficacy. On the other hand, the

parents who could not help found different ways to assist in their child's learning. However, these ways did not include direct help from them. Although they may provide encouragement for their child, or provide a positive home environment, they mainly prefer to get help from others. The others would be the school teachers, the internet, siblings, a preparatory school, a private tutor or neighbours' children, who can all potentially help support their child's learning.

The results demonstrated that there are differences between the education level of parents and their self-efficacy, in favour of the well-educated parents. Tekin (2008) and Izzo et al. (1999) studies results were consistent with the findings that parents' self-efficacy beliefs were affected by the parents' education level. This was supported by the interview data. The education level directly affects parents' self-efficacy. When it came to the less educated parents, they encountered the most serious problems regarding their efficacy, because they believed that they were unable to help, so they looked for ways that did not directly involve them in their child's learning, to provide them with support. Some of these ways may not be financially viable for them, like sending their child to a preparatory school, which requires extra money. If parents cannot afford it, their children will be left behind in their education. However, in Turkey, most parents of children in state and private schools send them to a preparatory school, for which they pay extra. This is not a problem for parents with a high income, but it is a serious problem for low-income parents. This can give an advantage to the children that come from well-educated and high income backgrounds.

The results also showed that parents with a career in science were more confident in assisting their child's science learning than parents who did not have a science background, but they were similar in terms of assisting their child's general learning. Regarding self-efficacy in science learning, parents with a science career agreed more than other parents with those items directly related to assisting their child's learning. These parents may be more knowledgeable about science and other subjects, and may use this knowledge to help their child's science learning.

Moreover, the results indicated that there are no considerable differences regarding parents' gender, the child's gender and school groups in relation to parents' self-efficacy in their child's both general and science learning, despite some small effect size differences.

#### **10.1.4 Parents' perceptions of invitations from the teachers and their child**

The third important construct of parental involvement were parents' perceptions of invitations from teachers and their child. These invitations are important, because they make parents think that their involvement is wanted, important and expected. The results illustrated that parents' perceptions of invitations from teachers and their child to be involved in their child's general (46%) and science learning (35%) were low. Their perceptions of invitations in assisting the science learning of their child were even lower. These low perceptions were the same across all the background variables, including parents' education level and science based career, even though there were some small effect size differences. Although the findings are inconsistent with Tekin's (2008) results, who reported that Turkish parents' perceptions of invitation from teacher are high (2/98/4.00 or %75), the results were consistent with Deslandes and Bertrand's (2005) and Pena's (2000) studies. Deslandes and Bertrand (2005) reported very low perceptions of invitations of parents from teachers, and Pena (2000) found that parents reported that they did not want to be involved in their child's learning and they did not receive any invitation by the teachers to get involved.

This component of parental involvement resulted in the least positive response from all the three components. This may suggest that the parents who wanted to be involved in their child's learning felt that they were able to offer support (the first 2 components) but did not feel that they had been supported in doing so, either by the teachers or by their own child. They might not know what support was available to them from the school, or how to access it. Moreover, parents felt less supported to help their child's science learning, than to assist in general learning, both by their child and by the teachers.

The interview finding yielded similar results. Although teachers and children do not particularly want their involvement, sometimes they request some help from parents. According to parents, the children may request help from their parents, either willingly or reluctantly. Some of the children may enjoy working with their parents on their learning. Some others may ask their parents for help because their parents want them to ask when they need help. Some children may not ask their parents for help because they believe that their parents are not able to help, or they do not like working with their parents on their schoolwork. Parents may value their child's learning, and teachers want them to support their child at home. However, most of the children do not willingly invite

their parents to be involved in their learning, due to their past experiences. For example, they may feel pressure from their parents regarding their homework.

On the other hand, according to parents, the teachers want two things from them. First, they want parents to police their child's learning by checking whether or not they have completed their homework, revised their school topics, or answered the daily target test questions that the teachers want the child to complete. Second, the teachers do not want parents to help with their child's learning or homework, unless they are able to do so. Parents may not see their involvement as important, because the teachers do not want them to get involved, except by controlling and monitoring the child's learning at home.

### **10.1.5 Parents' Attitudes towards Science**

This subsection discusses the findings regarding research question two: What are parents' attitudes towards science? To what extent does parents' attitudes towards science vary according to background?

Parents' attitudes towards science are important, because they affect parental involvement in the child's learning (Sun et. al. 2012) and influence the child's attitude towards science (Perera, 2014). A more positive attitude towards science leads to more academic success in science (George & Kaplan, 1998). Therefore, it is worthwhile to investigate the extend of parents' attitude towards science and how this related to their background.

The results illustrated that the overall parents' attitudes towards science was high (%74). Moreover, regarding the two constructs of parents' attitude towards science, the results were slightly different. Parents expressed more positive ideas about their child's science learning (%80) than their own ideas about science (%68), but both were positive. These findings are important, because these positive attitudes towards science can affect their science involvement and their child's attitudes towards science. In turn, this can increase their child's success in science (George & Kaplan, 1998).

Conversely, parents' positive attitudes towards science were similar, according to their backgrounds, but parents with a science career had a slightly better overall attitude. In addition, the results were the same for the parents' own ideas about science and their ideas about their child's science learning. Interestingly, while less educated parents

expressed more positive ideas about their child's science learning, the well-educated parents stated slightly higher ideas regarding their own ideas about science.

These results suggest that the parents' attitudes towards science were similar, regardless of the parent's gender, the child's gender, school group and family education level. This may be because parents see science as valuable and useful for their children to study. Besides, the majority of parents viewed their child's science learning positively, notwithstanding their own ideas about science. According to interviews, parents value the science-related learning of their child. They believe that their current science studies will help their child in their daily life, help them to get better marks in their national exam, help with later science lessons and be beneficial in their future career.

#### **10.1.5.1 Children's Attitudes towards Science**

The questionnaire on the children's attitude towards science was used to collect data from some of the children of these parents. However, relationships between children and their parents could not be established, in order to investigate the children's attitude towards science and the parents' background. Therefore, the children's gender and school type were only used for background relations. In addition, as it was beyond the scope of this study, the children could not be interviewed concerning ethical issues. The questionnaires results demonstrated that children's attitude towards science (65%) were positive. Moreover, boys' attitudes towards science were considerably better than those of girls. This finding is consistent with the literature. Osborne (2003) found that boys have more positive attitudes towards science than girls. In addition, specifically, more boys agreed with the majority of the items concerning learning science in school, self-concept in school, learning science outside of school and future participation in science.

#### **10.1.6 Summary of Stage One Findings**

The summary of Stage One findings is as follows:

- Parents' reported involvement level was positive and parents' involvement in general learning of their child's was higher than in science learning. In addition, the well-educated parents were more involved than the less educated parents, in both types of learning. However, according to interview results, most parents could not become involved directly in their child's learning.
- Parents' role construction beliefs were very positive for both science and general learning of their child. These beliefs were positive for all backgrounds.

- Parents' self-efficacy beliefs in assisting their child's science and general learning was also positive. However, most of the parents faced difficulties in assisting their child's learning. In addition, well-educated parents had more positive self-efficacy beliefs than less educated parents.
- Parents' perceptions of invitations from teachers and their child were low. Most of the time the parents' direct involvement was not preferred by either teachers or children.
- Parents' overall attitudes towards science were also high for the parents and did not differ depending on the parents' background.
- Children's attitudes towards science were positive and boys' attitudes were more positive than girls' attitudes.

## **10.2 Discussion of Stage Two (the Impact of the Intervention) of the Study**

The results of stage two, which was about the effect of parents' practising online science activities with their child, intervention on parental involvement, attitudes towards science and children's attitudes towards science results, are discussed in this section. Stage two of the study includes two main questions and eight sub-questions in total. The structure of this section follows the research questions through presenting the pre/post test results alongside the pre/post interview and the additional data results, to explain the impact of parental intervention. The intervention involved parents who sent their child to a private school and their child. Furthermore, the intervention involved parents practising Ttnet Vitamin online science activities with their child for five weeks.

### **10.2.1 Discussion of the third research question and its sub-questions: the effects on parental outcomes**

The third research question was 'What are the effects of the intervention on parental involvement, and its components, in terms of their child's general and science learning?' This question includes six sub-questions.

#### **10.2.1.1 What is the effect of the intervention on parental involvement in their child's general and science learning?**

The results demonstrated that the intervention had positive effect on parental involvement in their child's general and science learning. While the effect size was large for general learning, it was medium for science learning. This means that parents' involvement increased considerably in their child's both general and science learning. These results

were determined from the effect size differences of the experimental group's pre and post-intervention.

The post-interview results showed that almost all the parents enjoyed to working with their child and most of them would like to continue the activities by themselves. Some parents realised that their child needed their direct help. In addition, the less educated parents were able to help their child's learning through intervention.

The intervention provided parents with a set of effective and enjoyable ways to directly assist their child's learning, including the less educated parents. Parents did not need to know their child's school subjects, but only needed to follow instructions given by the science teacher. The intervention gave parents easy ways to effectively become involved with their child's learning, without boring the child. The purpose was to increase parent-child interaction over science activities online, to make parents listen to their child talk about what they learn in science lessons and how they interpret it, answer test questions together and use available resources from the teacher and the internet.

#### **10.2.1.2 Does the intervention change parental role construction beliefs about their involvement in their child's general and science learning?**

The pre-intervention results showed that parents' role construction beliefs regarding helping their child's both types of learning were very high prior to the intervention. In addition, pre and post-intervention effect size differences results illustrated that the intervention did affect parents' role construction in a small negative way. To interpret this finding it is important to look at what changed before and after the intervention; therefore, the interview results are important. According to the interview results, prior to the intervention, the main responsibilities of the parents with regard to their child's learning were communication with the school, helping with or guiding homework, or home studying, preparing their child for later life, providing a positive environment and providing a good education. All the parents valued their child's learning and wanted them to have a good future, in both their social and school life. However, a minority of parents believed education was the responsibility of the teachers, as they pay them extra money to provide a better education to their children.

After the intervention, parents were asked the same question to discover any changes in their views regarding their responsibilities. Most parents responded that the intervention

had altered some of their ideas, especially with regard to their beliefs about their responsibility in helping their children's learning at home. Parents realised that:

- they need to spend more time supporting their child's learning at home
- they should take more interest in their children's learning
- they need to follow and check whether or not their child understands the subjects
- they should understand what their child is learning at school, to be able to help them better at home.

Parents held certain ideas regarding their responsibility for their children's learning, especially in terms of helping with their learning, but when they tried to apply their ideas they realised that they had been too optimistic and positive, and that their ideas and responsibilities should differ from what they had expected. In other words, parents were more optimistic prior to the intervention regarding their responsibilities. This aspect relates more to what parents believe they should do regarding their children's learning, but may not reflect what they actually do. Therefore, they may have had more positive beliefs before the intervention, but once they put their beliefs into practice they realised their initial views were unrealistic.

Since parents held very positive beliefs regarding their responsibilities. However, what parents actually do to assist their child's learning is different from what parents should do to assist their child's learning. This was supported by the post-interview results, where parents reported that they should take more action when it comes to their child's learning, like spend more time with their child, make sure that their child understands school topics etc. Actually, most of the parents could not do what they said they should do. For example, most of them push their children to complete their homework, rather than directly getting involved in their learning. Due to fact that the intervention enables parents to practise some of their ideas, the post-intervention results indicate that they see that they actually do not do what they should do, and it is harder for them than they had thought or expressed. Changing parents' beliefs about what they should be doing increases their involvement in their child's learning. However, to do that, parents self-efficacy and invitations from others also play a part.



### **10.2.1.3 Does parents' self-efficacy about helping their child's learning in general and in science change after the intervention?**

The results from pre and post-interventions differences showed that the intervention has a small positive impact on parents' self-efficacy in assisting their child's general and science learning. The experimental group's parents' self-efficacy increased in both types of learning, but there was no discernible improvement in the control group scores.

Prior to the intervention, the majority of the experimental group parents stated that they were helping their child's science learning by asking them for and sharing ideas about science topics, directing them to complete extra research by giving them information about their topics, working with them, or giving them examples from their daily life experiences, as explained in Chapter Seven. However, these parents might also have faced some problems, such as their help being limited to science subjects. After the intervention, according to the post-interview results with the experimental group, almost all the parents agreed that when helping their child they identified topics or questions that they struggled with over the course of the intervention. Some parents reported difficulties with certain topics and the majority then sought assistance from the child's siblings or their children's teacher. However, parents did not seek help from teachers by contacting them directly, rather they spoke to their child to ask for assistance with topics, or the questions they were struggling with when at school. Other parents explained that they could not help their child with certain topics or questions, because they had forgotten the topics since they were at school. In addition, some of the parents mentioned that their children did not need help, because they believed their child could understand and locate mistakes and revise them independently.

The intervention offered parents a way of involvement in their child's science learning with providing guidance and instructions regarding how to help with their child's science-related learning at home. The purpose was to let parents to know the science topics of their child, to listen their child's understandings of their school topics, to learn briefly about the school topics from the website, to directly interact with their child's struggled topics or questions and to effectively communicate with their child's teacher in order to get help via email or phone calls. More generally, parents' confidence, knowledge and skills, and their communications with teachers targeted to be increased. The website science activities provided easy explanations for both parents and their child through visual and interactive way even the low education level's parents can understand easily.

As explained in Chapter Two, according to Bandura (1995) mastery experiences, vicarious experiences, social persuasion, physiological and emotional states were the four forms that increase self-efficacy beliefs. Four of these forms were experienced in the intervention in order to increase parents' self-efficacy beliefs in assisting their child's science learning. Firstly, the intervention provided parents to work interactively with their child on online science activities together in order to contribute their child's success in science. According to both parents' and children's feedback, almost all the participants enjoyed the program and they commented that they spent a quality time together. These positive experiences and feedback helped parents improve their mastery experiences and Bandura (1995) stated that this form is the most important source of creating strong self-efficacy beliefs. Secondly, being part of the program, receiving weekly guidance and instruction from the teacher and knowing other families doing the similar activities influenced parents' vicarious experiences which described by Bandura (1995) as seeing others succeed or fail about their actions could increase their self-efficacy beliefs. Thirdly, receiving weekly guidance and instructions from teacher, being part of the intervention and promoting their communications with parents can increase parents' social persuasions which described as receiving persuasions from other about their actions will results in higher self-efficacy beliefs (Bandura, 1995). Teacher and researcher invitations and valuing their interaction with their child's learning at home can help to increase this form of parents' beliefs and this may lead more self-efficacy in their child's learning at home. Fourthly, physiological and emotional states might work for some parents who have emotional concerns regarding their child's success or learning. The intervention helped some of these parents to support their child's learning in a way of using online website science activities.

The intervention helped parents to show interest, to watch science animations' learning together, to ask their child's ideas about their school topics and to request help from the teacher. These also helped parents to actively involve even though they do not have any ideas about their child's school topics. Since the intervention provided these to parents and show them how to practise them, their self-efficacy which included their knowledge and skills in their child's learning increased slightly. However, the interview and feedback results showed promised results even though some slight issues they encountered.

#### **10.2.1.4 To what extent do parents' perceptions of invitations from the teachers and their child to support their child's learning in general and in science change after the intervention?**

The findings demonstrated that the effect of the intervention on parents' perceptions of invitations from others, to help with their child's general and science learning, were positively large. The difference between pre and post-intervention was large for experimental parents, but there were no differences for control parents. In order to better understand these positive effects, the previous parental perceptions of invitations from teachers and their child need to be explored. The interviews help to achieve this goal. Prior to the intervention, according to parents' interviews, children willingly, or unwillingly requested their parents' help. These were related to the child's character or the parents' actions towards the child's learning. Although some children enjoyed working together with their parents at home, the majority of children do not want their parents to be involved in their learning. The main reasons were children's beliefs about the lack of abilities of their parents, negative past experiences with their parents and verbally pushing by the parents. These can decrease children's requests for help with their learning. However, since the intervention provided children with a way to interactively work with their parents, their beliefs regarding such requests changed in positive way. As supported by the children's feedback, most of the children enjoyed the activities and working together with their parents. Parents' perception of invitations from their child increased, because of the reported positive feedback from both parents and children.

On the other hand, according to parents and teachers, prior to the intervention teachers did not want the parents to help their children with their homework at home, except parents who are able to help. Teachers regularly contact the parents to give updates regarding their children and request them to control or monitor their children at home. However, the intervention resulted in a changed attitude in the science teachers, who were now asking the parents to become directly involved in their child's learning. This was achieved through informing them weekly about the activities, through giving instructions and guidance, and asking them to directly communicate with them if they needed any assistance regarding their child's learning or homework at home. The results showed that parents' perceptions of invitations increased, because they received both the teacher and their child's requests in order to be actively involved in their child's learning.

#### **10.2.1.5 What is the effect of the intervention on parent-teacher communications?**

One of the main purposes of the intervention was to increase the communication between the teacher and the parents. Only qualitative data were used to answer this question. According to the parents' interview, weekly feedback forms observation and teachers' interview, none of the parents used email to communicate with the teacher during the intervention, although half of the parents agreed that using email to communicate with the teacher is a good idea. In addition, most of the parents preferred not to communicate with the teacher when their child was struggling with topics or questions, even though some of them could not help their child. The findings illustrated that although the science teacher increased his communication during the intervention period, the intervention failed to increase parent-teacher communication and it may be difficult to increase the level of communication between parent and teacher. Most of the parents did not request any help from the teacher during the intervention, except some parents who instructed their child to ask their teacher about questions they were struggling with, but they did not choose to communicate directly. Some parents who needed help from the teacher hesitated to ask for help and others did not want to disturb the teacher. The reason why parents did not directly communicate with the teachers to help with topics their children struggled with needs further investigation, in order to increase communication between teachers and parents. The use of email in Turkey is not common and this may explain why Turkish parents did not use email during the intervention.

#### **10.2.1.6 To what extent did parents' attitudes towards science learning change after the intervention?**

The findings showed that the effect of the intervention on parents' attitudes towards science and their own attitudes towards science was positively small; however, due to their original stance, there was no palpable effect on their ideas about their child's science learning. The interview results support these findings. On the other hand, the control group's scores slightly decreased over the intervention period.

Some studies in the literature stated that positive experiences in science can increase science aspirations, interest and enjoyment, and this in turn improves one's attitude towards science (Dewitt and Archer, 2015; Lyons et al., 2012). The intervention targeted positive experiences of science both for parents and children, and this was expected to make a positive contribution to their attitude towards science. All the parents valued science and their child's science learning. They reported that they believed the current

science curriculum would help their children in their daily life, help them to get better marks in their national exam, provide a good foundation for further science lessons and be helpful in their future careers. Parents' positive attitudes towards science might increase their involvement and the value they attribute to the intervention. This may also help children to see that their parents value their science-related learning, which may affect their attitude towards science.

There was almost no study in the literature that investigated the effect of an intervention on parents' attitudes towards science, except Wehrell-Chester (1994) who investigated the impact of training parents to work with their children on science achievement, attitudes towards science and involvement in science. Parents were provided with instructions on how to help and work together with their children on their homework. There was no mention of the effect of the intervention on parents' attitudes towards science (See and Gorard, 2013). Further research is needed to investigate how to improve the parents' attitude towards science learning and the effect on children's attitude towards science.

### **10.2.2 The effects of the intervention on children's outcomes**

In this section, the findings on the effects of the intervention on children's related outcomes are discussed. There were two research questions about the effects on children. The first question was about the effect of the intervention on children's attitudes towards science and the second question was to what extent children's interest towards completing homework changed after the intervention.

#### **10.2.2.1 What was the effect of the intervention on children's attitudes towards science?**

The intervention had no effect on the children's attitude towards science. It was expected that positive experiences (Dewitt and Archer, 2015) and parental beliefs about science would affect children's interest and self-efficacy in science (Tenenbaum and Leaper, 2003), which in turn would improve their attitudes towards science.

Almost all the children reported that they enjoyed the intervention. The main reasons the children gave for enjoying the intervention were that they saw the benefits in their science

learning, even though this did not improve their attitude towards science, they appreciated the non-traditional way of studying and the interest of their parents in their learning. In addition, most of the children stated that they wished to continue the intervention, because they enjoyed learning about science in a different way and their parents took an interest in their learning. However, the lack of effect of the intervention may be because of the intervention period and the small sample size. Further investigation over a longer time period and more participants in experimental and control groups may reveal different results.

#### **10.2.2.2 To what extent did the children's interest towards completing homework change after the intervention**

This research question was answered based on pre and post interviews by parents. Prior to the intervention, parents reported mixed views regarding their child's level of interest towards completing their homework and their enthusiasm to learn at home. Unsurprisingly, some of the children were interested in learning and some of them were not. As the children who took part in the study were at a transition age, having begun the change from childhood to early youth, most of these children had interests other than their learning or homework. According to the parents, the attitudes of teachers, school subjects, the child's friends and the type of homework they had, all had an influence over their interest in learning and homework. Furthermore, the child's level of interest towards homework can affect their parents' involvement. For example, although they may want to take action, their action may remain verbal. Verbal nagging and warning may have a negative effect on the child; however, the intervention promoted the use of direct interaction with the child's learning, rather than verbal action. According to parents' post interviews, the intervention was beneficial to their child's science-related learning. Some parents reported an increased interest in science. For the children who like to use the internet and computers, their interest towards their science-related learning increased. However, this increase in interest may be because of the use of computers and the internet, rather than the intervention itself. The children also enjoyed working together with their parents and this may help to eliminate any misconceptions in relation to their parents' support in their learning.

### **10.2.3 Summary of the Stage Two Findings**

The findings of Stage Two of the study were as follows:

- The effect of parents' practising online science activities with their child was a positive increase in the parents' involvement in their child's general and science learning.
- The intervention slightly decreased parents' positive role construction beliefs. Parents benefited by turning or applying their beliefs to actions.
- Parents' self-efficacy changed slightly in a positive way after the intervention. Some difficulties that parents faced decreased, but subject-based difficulties did not change.
- Parents' perceptions of invitations from teachers and their child increased largely after the intervention. Children and science teachers valued and benefited from the involvement of parents.
- Parents' and children's attitudes towards science did not change after the intervention, but parents and children gave positive feedback for the intervention regarding science learning.
- The intervention failed to increase the communication between parents and teachers. In addition, using email for communication did not work.
- Children's interest towards completing homework increased after the intervention.

### **10.3 Evaluation of the Intervention**

The evaluation of the intervention by all participants (parents, children, teacher, researcher) is important because it helps to understand the applicability, practicability and effectiveness of the intervention in-depth. Therefore, evaluations from parents, children, the science teacher and the researcher are discussed in this section.

The majority of the parents and their children enjoyed the intervention and the activities, according to the parents, they mostly enjoyed the visual and interactive activities, which they said helped their child to understand their science topics better. However, the information that was provided alongside the activities on the website may not be enough to impart a detailed understanding of the topics and to enable the child to answer the test questions that follow. Children's motivation and encouragement might increase

alongside the interest that parents show in their child's learning, when using the 'Vitamin' website.

Almost all the children reported that they enjoyed the intervention. The main reasons the children gave for enjoying the intervention were that they saw the benefit of it in their learning, they enjoyed the non-traditional method of studying at home and appreciated the interest of their parents in their learning. The observations also supported this finding. In addition, most of the children stated that they wished to continue with the intervention, as they enjoyed learning about science in a different way and enjoyed seeing their parents interested and involved in their learning.

According to the science teacher, the children benefited from working with their parents at home using the website. The achievement levels and the self-confidence of some of the children improved following the intervention. The teacher gave an example of two children who had low exam and test results prior to the intervention, which increased unexpectedly following the intervention. However, the teacher also stated that the parents' participation in the intervention was difficult, due to their busy working schedules and lack of availability at home.

The researcher's evaluation is that, the children and their parents enjoyed and benefited from the intervention. They experienced a different process for science-related learning. However, parental participation in the intervention was very difficult, even though there were benefits for them and their children. The researcher was in regular contact with the parents throughout the intervention period, to make sure that parents completed the activities at the right time. The intervention does provide benefits to parents and their children, but implementation of the intervention and control of parents requires extensive work and time. Therefore, involving parents in their child's learning is difficult, despite the associated benefits. However, parental involvement would be improved by providing more flexible time, increased encouragement by school and teachers, and by explaining the positive effects of their involvement in their child's learning.



#### 10.4 Limitations of the Study

This study had certain limitations which may have affected the results. These were:

- This study was small scale research and did not have the resources to conduct large scale research. Another difficulty was recruiting parents into the study. Since participation was voluntarily, the parents who were more involved and more interested in their child's learning participated. This may influence the results in positive ways, or in a way that the researcher expected, but parents were matched according to their parental involvement level to decrease this limitation. Limited sample size also influenced the analysis. A significance test could not be used, because of the sample size and lack of randomisation.
- Experimental and control groups were used to compare the results and the effect of the intervention. However, due to limited sample size and participation rate, a matching method was used to match and allocate parents to experimental and control groups according to education level, general involvement level and gender, but there are other variables that can affect the similarities of the groups. Including more variables would increase the complexity of matching. It is not possible to have identical groups, but both groups were similar enough according to matched variables.
- The period of the intervention may not be adequate to change beliefs and attitude towards certain variables. Longer duration of the intervention may provide more reliable results, but time was limited for the researcher and for a PhD study. It is assumed and supported by other small scale quasi-experiments that five weeks will provide enough indications of the intervention's effect.
- The experimental groups received the intervention, but some confounding factors that these parents experienced in this time may lead to positive or negative effects. The control group was used to investigate any effects of the similar confounding factors. However, since the groups were from different cities and schools, they may have had different experiences during the intervention period. There might be an uncontrolled variable that could not be controlled and this might affect the results. For example, experimental parents used the internet alongside the activities of the intervention and these parents may come across some useful activities that affect their beliefs on or attitudes towards the internet.

- The findings of this study were only limited to the participants, because the results could not be generalised about Turkish parents. The main reason for that was lack of randomisation, small sample size and the interest of parents.

Another limitation of this study was the lack of follow-up data. Pre and post-interventions were used to find out the effect of the intervention. However, follow-up data would provide better explanations for the effect. Time and the distance between the researcher and the participants were the most important limitations for lack of follow-up data.

## **10.5 Reflective Evaluation, Recommendations and Implications of the Study**

This section includes two sub-sections. The first sub-section discusses and explains the reflective evaluation of the study from the findings. The second sub-section provides recommendations for future studies. This section ends with implications of the study.

### **10.5.1 Reflective evaluation of this study**

Many studies in the literature highlighted the importance of parental involvement in their children's learning both for parents and children. Parental involvement can take many forms and the most effective form is at-home good-parenting, in which parents help their children with homework and learning activities. The findings of this study demonstrated that both parents and children benefit from parental involvement at home and spending quality time together. The feedback results showed that one hour a week would be enough for parents to show interest and to spend time with their children on science activities. Although children's attitudes towards science did not change after the intervention, reported feedback from parents, teacher and children are promising.

Since all parents, those who send their children to public schools and those who send them to private schools, value their children's learning, they have very high beliefs regarding their responsibilities. However, they are not able to turn these beliefs to action. Instead, their beliefs regarding their role in their child's learning remain verbal. Therefore, interventions or programmes are needed to help parents turn their beliefs into actions. This will help to increase parental involvement in an effective way. The intervention suggested in this study helped parents to practise their beliefs regarding their role. The negative impact to parents' role beliefs indicated that their beliefs and actions were not the same. Their responses post-interview supported that. Parents agreed that

they need to be more directly involved in their child's learning through checking whether or not they have any difficulties with their school work.

All parents, including well-educated ones, meet with some difficulties when they get involved directly in their child's learning and learning activities at home. Although their self-efficacy seems positive, according to the questionnaire, the interview data showed that they were not confident, as they reported in the questionnaire. Education level, different education system, study areas and having forgotten much of their own schooling, were some of the difficulties preventing them from actively involving themselves in their children's learning. However, parents reported that they did not get enough encouragement from their child and the teachers, even though the teachers wanted them to monitor and control their child's learning at home.

Most of parents believed that science is important both for society and for their children. Their children, they believe, will benefit from the current science topics in their social and academic life. However, children's attitudes towards science were not good, and girls scored lower than boys. As suggested by the literature, parents' attitudes and interest in science can be conveyed to the children and this affects their attitude and achievement in science. Parents' and children's positive experiences in science would help to improve their attitudes. The intervention provided them with positive experiences, using online website activities by watching animations from daily life and sharing ideas. However, although interviews and feedback data showed the benefits of the intervention, the questionnaire results showed that there was no effect on parents' and children's attitudes towards science.

Communication between the home and the school is vital in increasing parental involvement. Unfortunately, the intervention failed to increase the communication between the parents and the teacher. Some parents needed help, but they hesitated to contact the teacher. Due to the limited time of the study, the reasons for this could not be explored in detail. However, parents may not want to share negative aspects of their children with the teachers. This needs further exploration.

Despite the benefits of parental involvement, involving parents in their child's learning was a very hard process. Their participation in the intervention was very difficult, even though it was beneficial to them and their children. The researcher was in regular contact

with the parents throughout the intervention period, to make sure that parents completed the activities at the right time. Implementation of the intervention and control of parents requires extensive work and time, or it will fail.

### **10.5.2 Recommendations for further studies**

In light of the findings, the following recommendations are suggested for further studies:

- Parents and children would benefit from effective parental involvement in learning at home. Parents will have quality time to spend with their children and children will see their parents' interest and support in their learning. As this study showed that most parents do not get involved effectively in their child's learning, most of the time giving verbal warnings and pressuring their children to complete their homework, interventions demonstrate to parents how to get involved effectively in their child's learning.
- New interventions that turn high parents' role construction beliefs to actions will benefit parents, children and teachers.
- Parents hesitate to become involved in their child's learning, because of perceptions about their self-efficacy. Parents though can help without having prior knowledge and skills, if they receive the right instruction. Seminars on how to effectively help their child's learning can be carried out at school.
- Children and teachers also have misconceptions about the efficacy of parental involvement, based on past experience with parents. Intervention programmes that change misconceptions help to increase parental invitations from teachers and children and this will lead to effective parental involvement. Teachers can also be instructed by the school about effective parental involvement.
- Communication between parents and teachers is important. Easy and fast communication strategies will be useful for parents. Email would not help, because the reply may take time. Phone calls were the fastest and the best way to communicate and they are recommended, as long as they can be scheduled not to interfere with working and teaching hours.
- Online learning websites, computers and ICT will be beneficial as additional learning methods at home.
- Policy makers in Turkey should carefully think about the effect of the national exams on young children. Policy makers and schools should reconsider

homework policies, taking into account children's need for non-learning activities. Parents must also realise that their children also need to do things other than homework.

- For researchers, involving parents in their children's learning is difficult. They need to sustain good communications with parents during an intervention period. Otherwise, the dropout level will increase.
- This study was limited to science activities of an online learning website. Similar interventions could be used for other subjects. In addition, children of different ages and their parents could be targeted for further research.

### **10.5.3 Implications of the Study**

Parental involvement in their child's science activities and spending time together would help struggling children to benefit and improve their academic outcomes. However, this study also shows that parents have misconceptions about how to effectively involve themselves in their child's learning at home. Most of the parents choose to be involved indirectly, by providing a positive learning environment at home, or by arranging and paying for preparatory schooling for their child. Most importantly, some of the parents pressure their children to complete their homework most of the time. This does not help children; instead they become uninterested in their learning and reluctant to do their homework, which in turn can affect their overall attitude towards education and academic achievement. Sometimes, this may lead to conflicts between parents and their children. This issue should be taken into consideration. Parents from different backgrounds need to be informed about the results of their actions. More effective programmes should be arranged by policy makers, schools, or teachers.

Online websites and ICT can be used for additional learning activities at home. Feedback from parents and children showed that such activities were fun, enjoyable, easy to follow, visual and different from the traditional methods. Paper-based activities sometimes bore children and this may make them reluctant to learn. Using online websites or ICT for learning at home helps children learn in an enjoyable and positive way. Learning websites and ICT can be used as additional materials for learning activities at home.

Parents' perceptions of invitations were low. The experiences of teachers and children with parents led to these low perceptions. Since parents had high role beliefs regarding their child's learning, they adopted ways they believed would help their child. However,

their way most of the time consists of verbal warnings and pushing, which makes the children resent their parents' actions and increases their desire for autonomy in their learning, as well as the belief that their parents are not able to help. These cause low invitations from children. On the other hand, teachers may also have negative experiences with parents regarding the children's learning at home. They may believe that their direct involvement will not help. However, the private schools which highlight parental involvement give parents a role at home to monitor their children's learning, checking whether or not they complete their homework at home, making sure that children follow their plan, but not helping directly, except parents who are able to help. The intervention provided both children and teacher with a way to involve parents. Children reported that they would like to work with their parents at home in this way. In addition, the teacher also benefited from the intervention and his or her ideas about parents improved. Teachers and school should be informed about effective parental involvement.

As stated by teachers, parents, children and observations, parents have heavy work schedules and most of the time they do not have much time to spend with their children. Parents have other responsibilities at home, when they come back from work. Therefore, most of the time, they could not show the required interest in their child's learning. However, children receive homework all the time in different subjects and they are expected to do homework almost every day. They go to school on week days and preparatory school at the weekend, or after school. The education system in Turkey makes children study almost every day without leaving them much time to do other things. Preparation for national exams starts very early. Children sit their first national exam in Year 8, to get accepted at a good high school, but they start preparing for this exam in Year 6 or earlier. Changes should be made by policy makers taking into consideration their young age and other requirements they may have at that age. Parents often send their children to a preparatory school when they are still very young to prepare them to compete in a highly competitive system, which affects their childhood. In addition, parents should not push their children daily to study at home. As parents need relaxing time after work, children also need relaxing time spent on other activities.

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## APPENDIX A: The sections, sub-sections and the number of the items of the parental involvement questionnaire

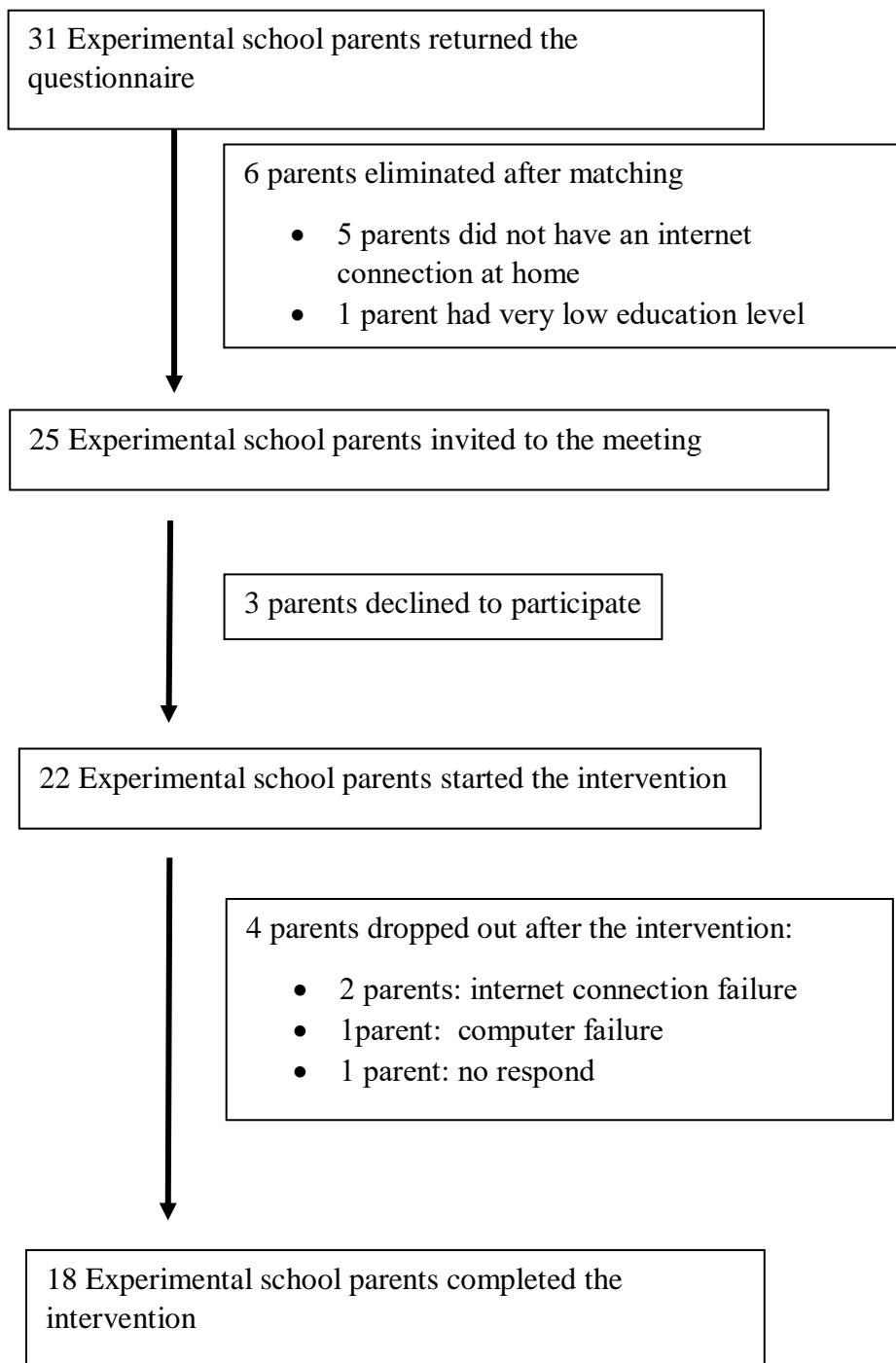
Parental Involvement Questionnaire					
Pre-intervention			Pro-intervention		
Section	Sub-section	Number of items	Section	Sub-section	Number of item
General involvement in child's learning	Parents' role activity Beliefs in general learning	8	General involvement in child's learning	Parents' role activity Beliefs in general learning	6
	Parents' past experience of own school	4		Parents' Efficacy	9
	Parents' Efficacy	9		Parents' Invitation from other for general involvement	11
	Parents' Invitation from other for general involvement	10		Parents' role activity beliefs in science learning	4
Involvement in Science Education Section	Parents' role activity beliefs in science learning	4	Involvement in Science Education Section	Parents' efficacy in science	7
	Parents' efficacy in science	7		Parents' Invitation from other for science involvement	7
	Parents' Invitation from other for science involvement	5		Communication with teachers	4
Use of the internet in learning and communication with teachers section	Parents' the internet and computer skills	6	Attitudes towards science section	Parents' own ideas about science	9
	Background information about internet and computer	5		Parents' ideas about their child's science education	9
	Invitation from other for the use of internet in learning	5	Parents' experience of the intervention		10
	Communication with teachers	4			
Attitudes towards science section	Parents' past experience of own school science	4	Background information		Parents' name, do you want to add anything about science learning of your child and do you want to add anything about the intervention questions
	Parents' own ideas about science	9			
	Parents' ideas about their child's science education	9			
Background Information section	Parents' name, gender, level of education and science related jobs, email, child's name and gender, partners' science related job and level of education, how many children do they have, birth order of the Year 7 child, who generally help child's home learning and do they want to add anything about parental involvement were asked.				

## APPENDIX B: The Timeline of the Study

		Meeting with the schools and the teachers	The Pilot Study	Handling the questionnaires to the parents via schools for Pre-intervention	Matching	Interviewing Experimental Group Parents	Interviewing Control Group Parents	Introduction and implementation of the intervention	The Intervention	Post-intervention Control Group Parents	Post-intervention and Interviewing Experimental Group Parents
	20Nov-27Nov										
	28Nov-5Dec										
	20Jan-14Feb										
	15Feb-23Feb										
	23Feb-02Feb										
	02-09Mar										
Week 1	17-23Mar										
Week 2	24-30Mar										
Week 3	31Mar-6Apr										
Week 4	7-13Apr										
Week 5	14-20Apr										
	21Apr-02May										



## Appendix C: The summary of the eliminated and dropped out parents



## APPENDIX D: The Percentage of Parents Who Agreed, Disagreed and Not Sure with Each Item of the Parental Involvement Questionnaire

Parents' Role Construction beliefs in General Learning		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	<b>56</b>	<b>146</b>	<b>89</b>	<b>110</b>	<b>146</b>	<b>55</b>	<b>95</b>	<b>107</b>	<b>99</b>	<b>59</b>	<b>202</b>
As a parent, I should communicate with my child's teacher regularly.	<b>A*</b>	100	97	98	98	98	98	100	96	98	100	<b>98</b>
	<b>DA*</b>	0	1	1	0	1	0	0	1	0	0	<b>1</b>
	<b>NS*</b>	0	2	1	2	1	2	0	3	2	0	<b>2</b>
...support the school's decisions about my child's learning.	<b>A</b>	96	89	92	91	92	89	92	91	90	95	<b>91</b>
	<b>DA</b>	2	1	1	2	2	0	2	1	2	0	<b>2</b>
	<b>NS</b>	2	10	7	7	6	11	6	8	8	5	<b>7</b>
...explain any homework my child finds difficult.	<b>A</b>	86	88	88	88	88	87	86	89	86	90	<b>88</b>
	<b>DA</b>	4	8	7	6	6	9	10	5	6	7	<b>7</b>
	<b>NS</b>	11	3	6	6	6	4	4	7	8	3	<b>5</b>
...make sure my child understands their homework.	<b>A</b>	98	97	99	96	97	98	98	97	96	100	<b>98</b>
	<b>DA</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
	<b>NS</b>	2	3	1	4	3	2	2	3	4	0	<b>3</b>
...help with my child's learning at home.	<b>A</b>	96	97	97	96	97	96	97	96	97	100	<b>97</b>
	<b>DA</b>	2	1	2	1	1	2	2	1	1	0	<b>2</b>
	<b>NS</b>	2	2	1	3	2	2	1	3	2	0	<b>2</b>
...talk with my child about what they are learning at school.	<b>A</b>	96	97	97	96	96	98	97	96	96	98	<b>97</b>
	<b>DA</b>	0	1	0	2	1	0	0	2	2	0	<b>1</b>
	<b>NS</b>	4	2	3	2	3	2	3	2	2	2	<b>3</b>
....attend special events at school.	<b>A</b>	64	68	67	66	69	60	60	73	67	66	<b>67</b>
	<b>DA</b>	16	14	16	14	13	18	18	11	12	19	<b>14</b>
	<b>NS</b>	20	19	17	20	18	22	22	16	21	15	<b>19</b>
....attend parent-teacher meetings.	<b>A</b>	93	99	99	96	97	98	97	98	98	97	<b>98</b>
	<b>DA</b>	2	0	0	1	1	0	1	0	0	0	<b>1</b>
	<b>NS</b>	5	1	1	3	2	2	2	2	2	3	<b>2</b>

(A=Agreeing Percentage, DA=Disagreeing Percentage, NS=Not sure percentage)

APPENDIX D CONTINUED:

Science Role Construction		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
...ask the science teacher about my child's progress.	<b>A</b>	98	98	98	98	99	96	99	97	99	100	<b>98</b>
	<b>DA</b>	2	2	2	2	1	4	1	3	1	0	<b>2</b>
	<b>NS</b>	0	0	0	0	0	0	0	0	0	0	<b>0</b>
...support the teacher's decisions about science education.	<b>A</b>	96	94	93	96	95	95	95	94	95	98	<b>95</b>
	<b>DA</b>	4	3	2	4	3	2	4	2	3	2	<b>3</b>
	<b>NS</b>	0	3	5	1	2	4	1	4	2	0	<b>3</b>
...help my child with their science learning at home.	<b>A</b>	88	85	85	86	85	87	83	88	83	88	<b>86</b>
	<b>DA</b>	5	10	8	9	9	7	11	7	9	7	<b>8</b>
	<b>NS</b>	7	6	7	6	6	6	6	6	8	5	<b>6</b>
...know what my child is learning in science.	<b>A</b>	91	93	93	92	92	93	88	95	95	86	<b>92</b>
	<b>DA</b>	7	3	3	5	4	4	6	2	2	7	<b>4</b>
	<b>NS</b>	2	5	3	4	4	4	5	3	3	7	<b>4</b>

APPENDIX D CONTINUED:

Parents' Self-Efficacy in General Learning		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
I don't know how to support my child's learning.	<b>A</b>	64	58	63	56	58	62	64	55	55	64	<b>59</b>
	<b>DA</b>	23	34	26	36	36	18	23	38	38	20	<b>31</b>
	<b>NS</b>	13	8	11	8	6	20	13	7	7	15	<b>9</b>
I can make a significant difference in my child's school success.	<b>A</b>	77	71	69	76	73	73	70	76	74	76	<b>73</b>
	<b>DA</b>	13	17	19	14	17	13	16	16	15	9	<b>16</b>
	<b>NS</b>	11	12	12	10	10	15	15	8	11	15	<b>11</b>
I can explain some homework to my child.	<b>A</b>	80	77	89	69	73	91	80	77	72	90	<b>78</b>
	<b>DA</b>	13	16	8	21	19	6	14	16	19	5	<b>15</b>
	<b>NS</b>	7	7	3	10	8	4	6	8	9	5	<b>7</b>
I have enough knowledge about my child's school subjects to help with their homework.	<b>A</b>	48	43	47	43	42	51	53	37	31	66	<b>45</b>
	<b>DA</b>	29	27	29	26	32	16	25	30	34	14	<b>28</b>
	<b>NS</b>	23	30	24	31	26	33	22	33	34	20	<b>28</b>
I know what my child is learning in their lessons.	<b>A</b>	59	63	69	56	60	66	66	58	53	73	<b>62</b>
	<b>DA</b>	20	14	12	18	16	13	14	17	23	5	<b>15</b>
	<b>NS</b>	21	23	19	26	23	22	20	25	24	22	<b>23</b>
I am able to make use of daily life experiences (e.g. while at home or at the supermarket) to teach my child.	<b>A</b>	82	85	88	81	83	87	83	85	83	85	<b>84</b>
	<b>DA</b>	9	10	9	11	12	4	8	11	11	7	<b>10</b>
	<b>NS</b>	9	5	3	8	5	9	8	4	6	9	<b>6</b>
I know where to find resources to support my child's learning.	<b>A</b>	86	87	88	86	86	87	85	88	85	86	<b>87</b>
	<b>DA</b>	5	6	3	8	8	2	6	6	8	0	<b>6</b>
	<b>NS</b>	9	7	9	6	6	11	8	7	7	14	<b>7</b>
I know how to use the internet to support my child's learning.	<b>A</b>	70	58	63	58	64	53	70	53	53	75	<b>61</b>
	<b>DA</b>	21	36	30	34	31	35	22	40	41	17	<b>32</b>
	<b>NS</b>	9	7	7	8	6	13	8	7	6	9	<b>7</b>
I can use a learning website to support my child's learning.	<b>A</b>	63	50	57	50	53	53	60	48	41	70	<b>54</b>
	<b>DA</b>	27	38	30	38	36	33	28	40	44	20	<b>35</b>
	<b>NS</b>	11	12	12	12	11	15	12	12	14	10	<b>12</b>

APPENDIX D CONTINUED:

Parents Self-efficacy in Science		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
I don't know how to help my child's learning in science.	<b>A</b>	52	44	47	46	48	42	52	41	38	63	<b>46</b>
	<b>DA</b>	36	47	39	46	44	42	35	51	53	22	<b>44</b>
	<b>NS</b>	13	10	14	7	8	16	14	8	9	15	<b>10</b>
I can improve my child's achievement in science.	<b>A</b>	70	69	72	67	70	67	67	71	64	75	<b>69</b>
	<b>DA</b>	11	14	14	13	12	16	15	11	14	9	<b>13</b>
	<b>NS</b>	20	17	15	20	19	16	18	18	22	17	<b>18</b>
I have enough information about what my child is learning in science.	<b>A</b>	57	58	60	56	55	66	58	58	53	63	<b>58</b>
	<b>DA</b>	23	26	24	27	28	18	22	28	29	17	<b>25</b>
	<b>NS</b>	20	16	17	16	17	16	20	14	18	20	<b>17</b>
I can help my child some of their science homework.	<b>A</b>	75	69	73	67	66	80	75	66	61	81	<b>70</b>
	<b>DA</b>	7	23	20	17	21	13	15	22	24	9	<b>18</b>
	<b>NS</b>	18	9	7	16	13	7	11	12	15	10	<b>11</b>
I can explain science subjects to my child.	<b>A</b>	54	39	49	38	40	49	50	37	28	64	<b>43</b>
	<b>DA</b>	27	37	34	35	37	27	30	38	43	15	<b>34</b>
	<b>NS</b>	20	24	17	27	23	24	21	24	28	20	<b>23</b>
I can find resources to help my child's learning in science.	<b>A</b>	77	66	72	67	66	76	73	66	65	76	<b>69</b>
	<b>DA</b>	13	23	20	21	25	9	16	24	25	12	<b>20</b>
	<b>NS</b>	11	10	8	12	9	15	12	9	10	12	<b>10</b>
I don't know how to explain science subjects to my child using real life examples.	<b>A</b>	88	86	88	86	86	86	83	89	86	83	<b>86</b>
	<b>DA</b>	2	6	6	5	6	2	5	5	4	7	<b>5</b>
	<b>NS</b>	11	8	7	10	8	13	12	7	10	10	<b>9</b>
I know where to find resources on the internet to help my child's learning in science.	<b>A</b>	68	51	63	50	54	58	63	49	42	70	<b>55</b>
	<b>DA</b>	23	36	25	38	34	27	21	42	46	12	<b>32</b>
	<b>NS</b>	9	14	12	12	12	15	16	9	12	19	<b>12</b>

APPENDIX D CONTINUED:

Invitation from others for general learning		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
One of my child's teachers explained asked you to help your child with their homework?	<b>A</b>	43	38	47	34	36	49	42	37	34	46	<b>40</b>
	<b>DA</b>	41	51	40	55	51	42	44	51	50	42	<b>48</b>
	<b>NS</b>	16	11	12	12	14	9	14	11	16	12	<b>12</b>
.... explained to you what your child is learning in their lessons?	<b>A</b>	48	53	42	59	53	47	51	52	51	54	<b>52</b>
	<b>DA</b>	41	38	45	35	39	38	36	41	41	29	<b>39</b>
	<b>NS</b>	11	10	14	6	8	15	14	7	8	17	<b>10</b>
.... asked you to talk with your child about their school day?	<b>A</b>	38	52	36	57	49	46	47	49	48	53	<b>48</b>
	<b>DA</b>	50	41	52	38	44	44	44	43	44	37	<b>44</b>
	<b>NS</b>	13	7	12	5	8	11	8	8	8	10	<b>8</b>
.... explained to you how to help with your child's learning?	<b>A</b>	48	64	54	63	63	49	56	63	62	56	<b>59</b>
	<b>DA</b>	41	25	35	26	26	40	34	26	26	31	<b>30</b>
	<b>NS</b>	11	11	11	11	11	11	11	11	12	14	<b>11</b>
.... asked you to attend a special event at school?	<b>A</b>	55	38	46	40	39	53	52	36	35	51	<b>43</b>
	<b>DA</b>	36	49	45	47	49	38	39	51	54	37	<b>46</b>
	<b>NS</b>	9	12	9	13	12	9	10	13	11	12	<b>11</b>

APPENDIX D CONTINUED:

Invitation from others for general learning (continued)		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
.... asked you to help out at the school?	<b>A</b>	41	33	37	34	37	29	28	41	34	29	<b>35</b>
	<b>DA</b>	45	50	44	53	48	51	53	45	51	48	<b>49</b>
	<b>NS</b>	14	17	19	14	15	20	19	14	15	24	<b>16</b>
.... to me how to use the internet to support my child's learning.	<b>A</b>	29	21	27	20	25	18	21	25	22	24	<b>23</b>
	<b>DA</b>	59	71	64	71	66	73	67	68	68	63	<b>68</b>
	<b>NS</b>	13	8	9	9	9	9	12	7	10	14	<b>9</b>
.... explained to me how to use learning websites to help my child's learning.	<b>A</b>	16	12	11	15	15	7	11	16	13	12	<b>13</b>
	<b>DA</b>	73	81	78	80	78	82	81	77	79	78	<b>79</b>
	<b>NS</b>	11	7	11	6	7	11	8	8	8	10	<b>8</b>
.... wanted me to use the internet to support my child's learning.	<b>A</b>	23	18	19	19	21	15	12	26	21	12	<b>19</b>
	<b>DA</b>	66	75	67	76	72	75	77	68	73	71	<b>72</b>
	<b>NS</b>	11	8	14	5	8	11	12	6	6	17	<b>8</b>
My child asked me to explain something about their homework.	<b>A</b>	77	69	71	71	70	75	79	65	61	92	<b>71</b>
	<b>DA</b>	16	26	21	26	26	16	19	27	30	7	<b>23</b>
	<b>NS</b>	7	5	8	4	4	9	2	8	9	2	<b>5</b>
.... talked with me about their school day.	<b>A</b>	88	88	87	88	88	87	90	86	86	93	<b>88</b>
	<b>DA</b>	11	7	8	8	8	9	10	7	8	7	<b>8</b>
	<b>NS</b>	2	6	6	4	5	4	1	8	6	0	<b>5</b>
.... asked me to help out at their school.	<b>A</b>	38	34	36	35	36	33	26	43	38	29	<b>35</b>
	<b>DA</b>	50	59	54	58	56	58	64	50	51	63	<b>56</b>
	<b>NS</b>	13	7	10	7	8	9	10	8	11	9	<b>8</b>
.....explained to me what they are learning in their lessons.	<b>A</b>	75	75	76	74	74	78	75	76	71	85	<b>75</b>
	<b>DA</b>	20	16	17	18	19	13	21	14	17	12	<b>17</b>
	<b>NS</b>	5	8	7	8	7	9	4	10	12	3	<b>7</b>

APPENDIX D CONTINUED:

Invitation from others for science learning		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
My child's science teacher wanted me to support my child's science homework.	<b>A</b>	39	40	35	44	40	40	35	45	43	34	<b>40</b>
	<b>DA</b>	46	49	49	47	49	46	51	46	47	49	<b>48</b>
	<b>NS</b>	14	11	16	9	11	15	15	9	10	17	<b>12</b>
.... informed me about what my child is learning in science.	<b>A</b>	41	36	33	40	37	36	32	42	34	36	<b>37</b>
	<b>DA</b>	48	54	51	55	55	47	55	51	57	48	<b>53</b>
	<b>NS</b>	11	10	17	6	8	16	14	8	9	17	<b>10</b>
.... helped me to support my child's science learning at home.	<b>A</b>	29	24	21	28	27	20	15	35	28	17	<b>25</b>
	<b>DA</b>	61	60	66	56	60	62	66	55	60	61	<b>60</b>
	<b>NS</b>	11	16	12	16	13	18	19	10	12	22	<b>14</b>
My child has asked me to help them with their science homework.	<b>A</b>	57	42	46	46	43	53	47	45	39	58	<b>46</b>
	<b>DA</b>	38	47	42	46	47	38	43	45	49	34	<b>44</b>
	<b>NS</b>	5	12	12	8	10	9	10	10	12	9	<b>10</b>
.... told me what they are learning in science.	<b>A</b>	57	60	57	61	59	60	55	64	59	63	<b>59</b>
	<b>DA</b>	34	30	32	31	30	35	41	22	28	34	<b>31</b>
	<b>NS</b>	9	10	11	8	11	6	4	14	13	3	<b>9</b>
.... to use the internet to help with their science homework.	<b>A</b>	27	14	17	18	16	22	20	16	15	22	<b>18</b>
	<b>DA</b>	64	79	75	76	77	71	71	79	79	64	<b>75</b>
	<b>NS</b>	9	7	8	6	8	7	10	6	6	14	<b>7</b>
.... wanted me to do learning website's science activities together.	<b>A</b>	25	11	14	16	13	18	15	15	15	17	<b>15</b>
	<b>DA</b>	73	82	79	81	82	76	80	79	81	75	<b>80</b>
	<b>NS</b>	2	7	8	4	6	6	5	6	4	9	<b>5</b>



APPENDIX D CONTINUED:

Science Attitude		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
I believe that science is useful in everyday life.	<b>A</b>	93	84	87	86	84	91	92	81	84	92	<b>86</b>
	<b>DA</b>	2	1	2	1	1	2	1	2	1	2	<b>2</b>
	<b>NS</b>	5	15	11	14	14	7	7	17	15	7	<b>12</b>
Science and technology are making our lives healthier, easier and more comfortable.	<b>A</b>	89	89	85	92	90	87	87	91	91	86	<b>89</b>
	<b>DA</b>	2	4	5	3	2	7	4	3	3	3	<b>4</b>
	<b>NS</b>	9	7	10	6	8	6	8	7	6	10	<b>7</b>
I do not have much interest in science.	<b>A</b>	57	63	63	59	59	67	67	56	53	75	<b>61</b>
	<b>DA</b>	27	29	26	31	30	24	23	33	35	15	<b>28</b>
	<b>NS</b>	16	8	11	10	11	9	10	11	12	10	<b>10</b>
I like to read about some scientific topics such as health, technology, environment	<b>A</b>	77	80	80	77	79	78	77	80	78	76	<b>79</b>
	<b>DA</b>	14	13	12	15	13	15	15	12	12	14	<b>13</b>
	<b>NS</b>	9	8	8	8	8	7	8	8	10	10	<b>8</b>
I find it difficult to understand scientific ideas.	<b>A</b>	63	45	51	47	46	58	61	39	41	64	<b>50</b>
	<b>DA</b>	29	41	35	41	40	33	28	46	43	22	<b>38</b>
	<b>NS</b>	9	14	15	12	14	9	11	15	15	14	<b>13</b>
I like to watch TV programs about science (e.g. documentaries).	<b>A</b>	91	88	87	91	88	91	83	94	96	78	<b>89</b>
	<b>DA</b>	9	7	9	6	8	6	11	5	4	12	<b>7</b>
	<b>NS</b>	0	5	5	3	3	4	6	1	0	10	<b>4</b>
I am good at science.	<b>A</b>	55	48	51	50	47	58	50	51	48	61	<b>50</b>
	<b>DA</b>	23	23	19	26	26	15	22	23	26	15	<b>23</b>
	<b>NS</b>	21	30	30	25	27	27	28	26	26	24	<b>27</b>
I like discussing scientific problems.	<b>A</b>	61	62	62	62	58	69	59	64	63	63	<b>61</b>
	<b>DA</b>	21	26	20	28	28	16	25	24	24	20	<b>25</b>
	<b>NS</b>	18	12	18	10	14	15	16	12	13	17	<b>14</b>
You have to be clever to study science.	<b>A</b>	45	47	42	50	48	42	45	48	47	44	<b>47</b>
	<b>DA</b>	50	43	49	42	45	46	40	50	51	41	<b>45</b>
	<b>NS</b>	5	10	9	8	7	13	15	3	3	15	<b>8</b>

APPENDIX D CONTUNIED:

Science Attitude (Continued)		Parents' Gender		Child's gender		Science Career		School Group		Family Education		Total
		Male	Female	Boy	Girl	No	Yes	Private	Public	Lower	Higher	
	<b>N</b>	56	146	89	110	146	55	95	107	99	59	<b>202</b>
I would encourage my child to study science.	<b>A</b>	88	94	91	93	93	91	92	93	94	92	<b>92</b>
	<b>DA</b>	5	3	5	4	3	6	3	5	2	3	<b>4</b>
	<b>NS</b>	7	3	5	4	4	4	5	3	4	5	<b>4</b>
My child enjoys science.	<b>A</b>	79	84	82	83	80	87	80	84	86	80	<b>82</b>
	<b>DA</b>	9	7	7	8	9	4	7	8	6	7	<b>7</b>
	<b>NS</b>	13	10	11	9	11	9	13	8	8	14	<b>10</b>
My child does not have much interest in science.	<b>A</b>	79	83	80	84	84	76	79	84	83	85	<b>82</b>
	<b>DA</b>	14	12	15	12	12	15	13	13	14	9	<b>13</b>
	<b>NS</b>	7	5	6	5	4	9	8	3	3	7	<b>5</b>
My child sees science as being useful in everyday life.	<b>A</b>	80	73	78	74	73	82	73	78	81	71	<b>75</b>
	<b>DA</b>	13	14	14	15	16	7	13	15	12	10	<b>14</b>
	<b>NS</b>	7	12	9	12	11	11	15	8	7	19	<b>11</b>
My child enjoys discussing scientific topics.	<b>A</b>	70	72	74	69	69	78	66	76	76	63	<b>71</b>
	<b>DA</b>	14	16	11	18	19	6	16	15	14	19	<b>15</b>
	<b>NS</b>	16	12	15	13	12	16	18	9	10	19	<b>13</b>
My child is good at science.	<b>A</b>	89	82	85	83	83	86	84	83	85	86	<b>84</b>
	<b>DA</b>	5	11	7	12	10	9	11	8	7	9	<b>9</b>
	<b>NS</b>	5	8	8	6	8	6	5	8	8	5	<b>7</b>
My child will need to use science in their future job.	<b>A</b>	80	77	84	74	76	84	79	78	81	73	<b>78</b>
	<b>DA</b>	9	8	5	12	11	2	5	11	7	7	<b>8</b>
	<b>NS</b>	11	14	11	15	13	15	16	11	12	20	<b>13</b>
Knowing science will help my child to be more successful in life.	<b>A</b>	93	94	94	93	94	93	92	95	98	92	<b>94</b>
	<b>DA</b>	2	2	2	2	2	2	2	2	1	3	<b>2</b>
	<b>NS</b>	5	4	3	6	4	6	6	3	1	5	<b>5</b>
My child would like to study science at a more advanced level.	<b>A</b>	68	64	69	64	63	73	62	68	71	63	<b>65</b>
	<b>DA</b>	9	14	11	14	14	7	11	15	12	10	<b>13</b>
	<b>NS</b>	23	21	20	23	23	20	27	17	17	27	<b>22</b>

## APPENDIX E: The Percentage of Children Who Agreed and Disagreed with Each Item of the Children's Attitudes towards Science Questionnaires

			Gender		School		Total
			Boys	Girls	Private	Public	
Interest in science learning	I find it is easy to concentrate in science lessons.	A	78	73	75	83	76
		D	6	8	6	10	7
	I find it is easy to understand science topics.	A	74	65	70	69	69
		D	10	10	12	3	10
	I can explain science topics in my own words.	A	78	61	69	76	70
		D	6	14	9	10	10
	I find it is easy to relate the last science lessons with previous lessons.	A	75	70	72	72	72
		D	7	14	10	10	10
	I revise science lessons daily at home.	A	66	61	60	79	63
		D	14	9	13	3	11
	I follow a regular plan to study science subject(s) at home.	A	61	46	50	72	54
		D	14	22	20	3	17
	I complete science homework before going out to play.	A	72	71	67	90	71
		D	10	11	12	3	11
Learning science in school	We learn interesting things in science lessons.	A	91	78	85	86	85
		D	6	11	9	7	8
	I look forward to my science lessons.	A	65	57	58	76	61
		D	9	19	14	10	14
	Science lessons are exciting.	A	80	59	69	76	70
		D	11	25	17	21	18
	I want to do more science at school.	A	63	35	49	55	50
		D	17	29	22	24	23
	I like science better than most other subjects.	A	55	56	59	38	55
		D	23	23	18	45	23
	Science is boring.	A	81	71	76	76	76
		D	9	13	10	14	11
Self-concept in science	I find science difficult.	A	64	41	51	59	53
		D	22	29	23	34	25
	I am just not good at science.	A	78	62	68	83	71
		D	9	20	16	7	14
	I get good marks in science.	A	76	78	75	86	77
		D	9	6	9	3	8
	I learn science quickly.	A	70	46	56	72	59
		D	7	23	15	10	14
	Science is one of my best subjects.	A	68	43	54	66	56
		D	15	28	21	21	21
	I feel helpless when learning science.	A	72	56	62	76	64
		D	18	24	22	14	21

## APPENDIX E CONTINUED:

			Gender		School		Total
			Boys	Girls	Private	Public	
Science outside of school	I would like to join a science club.	A	53	44	48	55	49
		D	25	32	28	31	28
	I like watching science programmes on TV (e.g. documentaries).	A	78	54	65	76	67
		D	11	32	22	17	21
	I would like to do more science activities outside school.	A	65	52	59	59	59
		D	15	23	17	24	19
	I like reading science magazines and books.	A	77	65	70	79	71
		D	13	20	16	17	16
Future participation in science	It is exciting to learn about new things happening in science.	A	88	78	81	93	83
		D	3	6	4	7	5
	I would like to study more science in the future.	A	59	52	52	72	56
		D	17	27	21	24	22
	I would like to study science at university.	A	68	48	56	72	59
		D	11	33	23	14	22
	I would like to have a science related job.	A	74	57	64	72	66
		D	11	19	14	21	15
Importance of science	Science are important for society.	A	93	84	90	83	89
		D	2	5	4	3	4
	Science make our lives easier and more comfortable.	A	86	85	85	90	86
		D	6	5	5	7	5
	Science and technology are helping the poor.	A	40	28	37	21	34
		D	34	37	36	34	35
	There are many exciting things happening in science and technology.	A	81	59	70	72	71
		D	14	18	16	14	16
Family Models	I think my mother loves science.	A	53	54	55	48	54
		D	13	19	14	21	16
	I think my father loves science.	A	59	54	60	41	57
		D	13	18	14	17	15
	My family loves to watch TV programmes related to science.	A	50	51	50	52	50
		D	28	15	23	17	22

## APPENDIX F: Consent Form

### Parent consent form to participate in a study about parental involvement in children's science learning

Dear Parent,

My name is Nihat Altinoz and I am a PhD student at the University of Leicester in the UK. I am currently undertaking research into parents' involvement in their child's learning especially in science education. As part of my research I would like to find out more about how you are involved in your child's learning both in general and in science. The information will help researchers understand what parents do to support their child's learning and will help schools and teachers to support parents and students more effectively.

I would like to invite you and your Year Seven child to participate in this study. Your participation is completely voluntary and you have the right to withdraw at any time. If you agree to participate, you will be asked to help with your child's science learning at home for five weeks. You will be asked to complete questionnaires and interviews before and after taking part in the study. In addition, I would like to visit your home for a face to face interview.

Taking part in this study will cause no harm to you and your child. It should help you to support your child's learning more effectively and will improve communication with your child's teacher. The information that you and your child will provide will not be revealed to anyone other than the researcher. It will be kept confidential and will be only used for the purpose of this study.

If you are willing to participate in the study, please sign the consent form below. Please let me know if you have any questions. You can contact me at:

Nihat Altinoz  
Phone number:  
Email:

Thank you for your time and support.

Yours sincerely

Nihat Altinoz

---

My child and I are willing to participate in this study as described above.

Name of the parent:

Name of the child:

Sign:

Date:

## APPENDIX G: Example of the weekly activities and some pictures of them from Ttnet Vitamin Website

### First Week Activities: Chemical Bonds

Your child studied the chemical bonds topic in their lesson last week. The subtitles of this topic are:

- 1) Chemical bond
- 2) Ionic bond
- 3) Covalent Bond

**1. Sign in to Vitamin:** Your child has free membership of Ttnet Vitamin. Please sign in to your child's account from the homepage of the website (from the picture on top-right of the homepage).

**2. Access to activities:** After signing in please enter 'the topics' tab as shown in the picture at the right.



You will see the list of the topics as shown in the left picture. you will see the subtitles of this week activities as shown in the right picture. Please watch the activities with your child respectively.

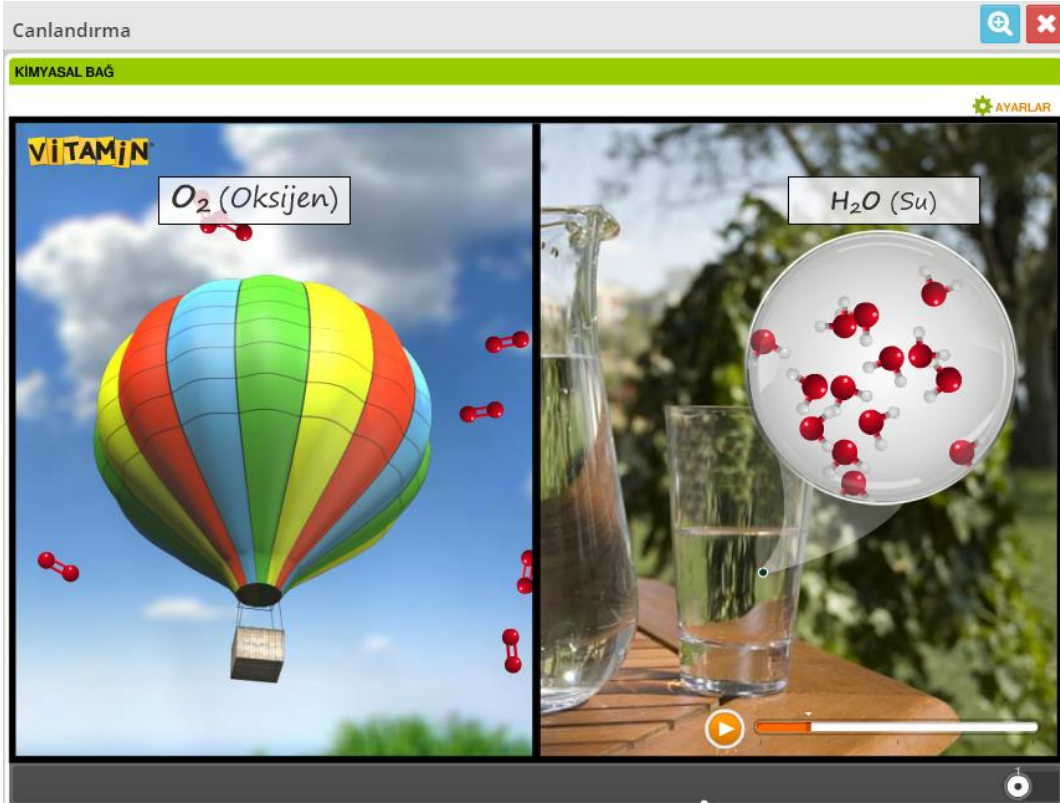
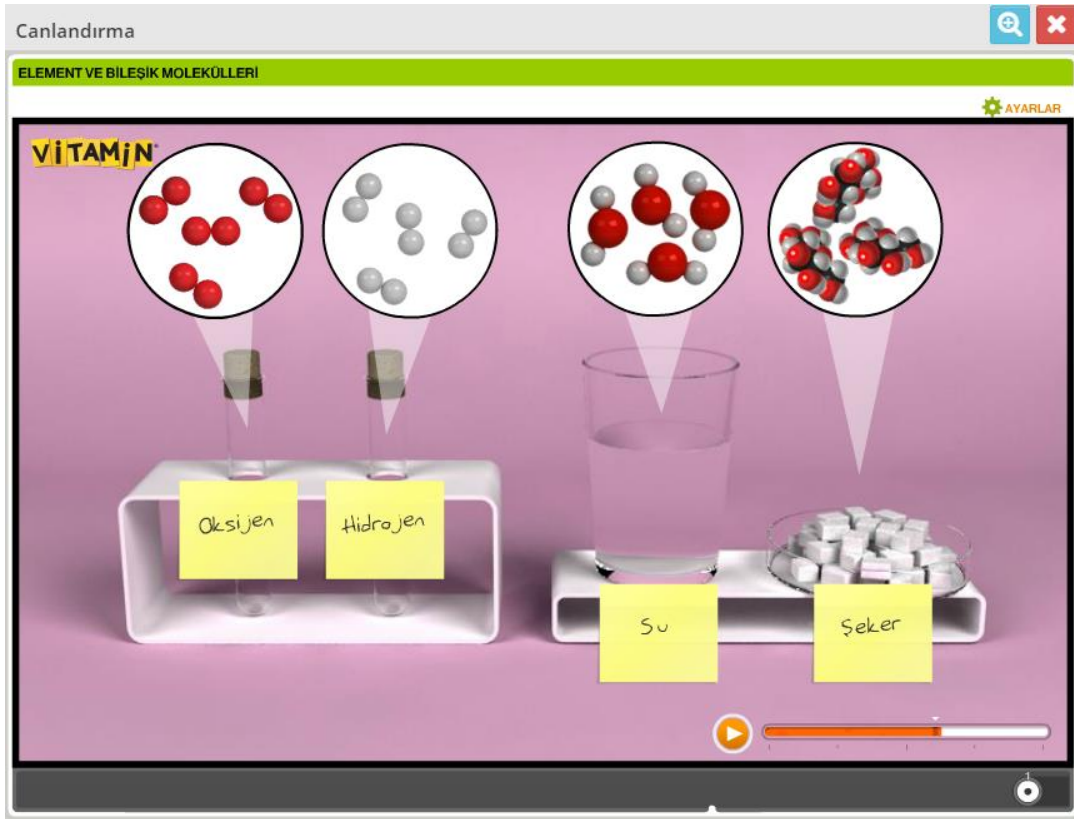
After watching all activities please click the tests tab which it is shown in the left bottom picture. Please answer only 5 questions with your child. First let your child to answer the questions and then ask him/her how did you



answer it. You can help your child if he/she doesn't know the answers. If you need any help please ask your child's teacher by contacting him from this email address: [velikatilimi@gmail.com](mailto:velikatilimi@gmail.com) or by a phone call.

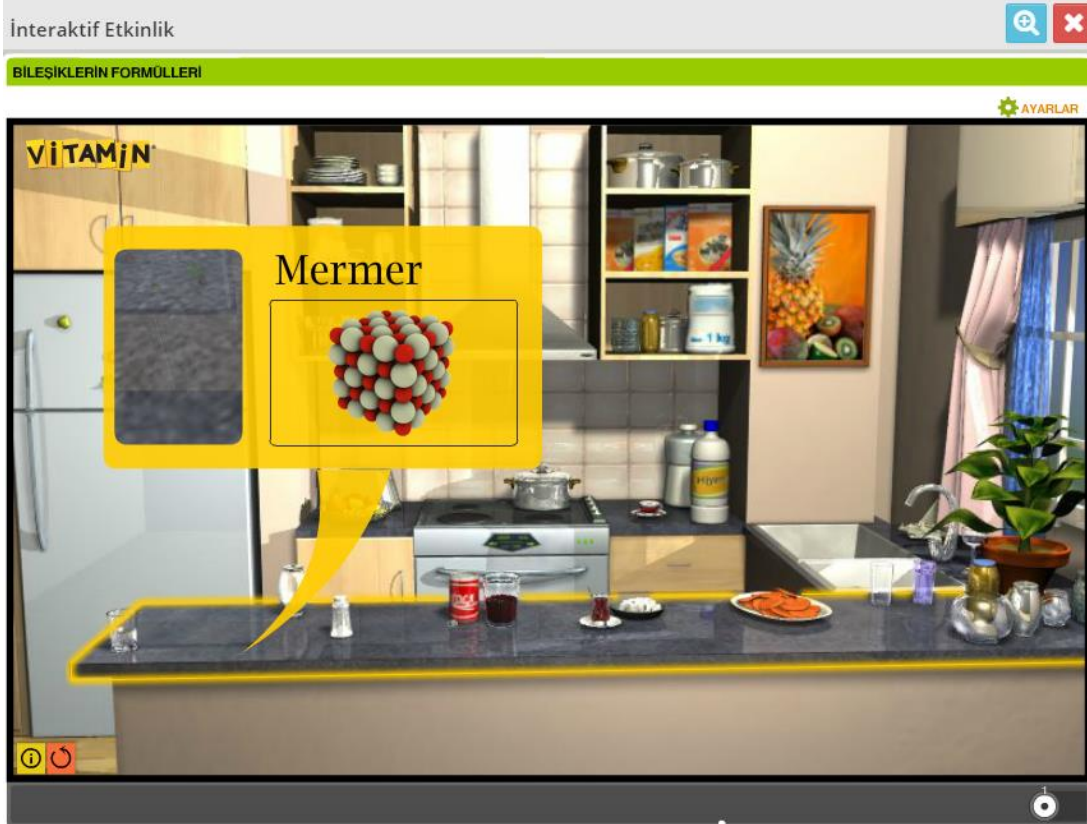
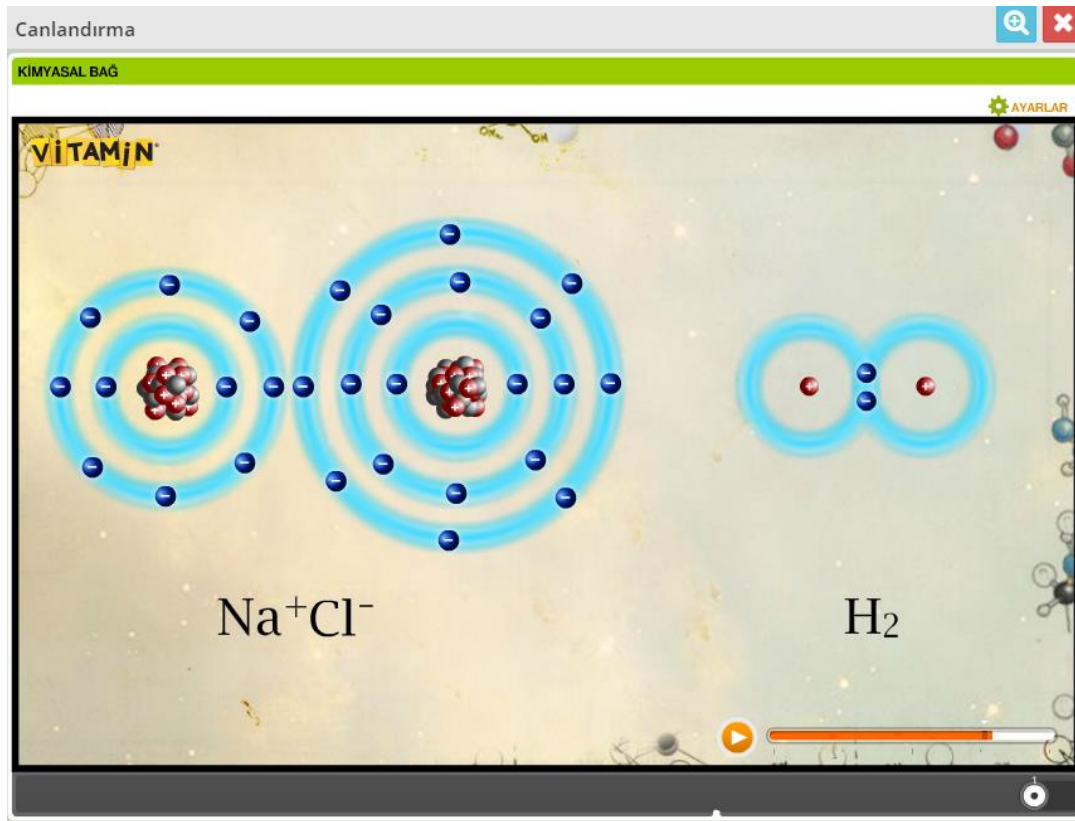
Please complete the weekly feedback form after completing all the activities and the test questions. Please complete this week's activities before Friday and send the feedback form to your child's teacher back in a sealed envelope or by email.

APPENDIX G CONTUNIED: Some Pictures of the activities from the Ttnet Vitamin Website:





APPENDIX G CONTUNIED:





## APPENDIX H: Pre and Post Interview Questions for Parents

### Pre interview Questions:

1. I want to ask you about your child's learning at home. Is your child (7 grade child) keen on doing their homework? How often do they bring homework?

**A. İlk önce çocuğunuzun (7.sınıf) evdeki durumuyla ilgili sorular sormak istiyorum. Çocuğunuz ne sıklıkla ders çalışır? Veya ne sıklıkla ödev getirir? Ders çalışmaya veya ödevlerini yapmaya istekli mi?**

2. As a parent, what do you think are your responsibilities with regard to your child's learning?

**B. Bir veli olarak, çocuğunuzun eğitimindeki sorumluluklarınızın sizce nelerdir? Çocuğunuzun ödevlerine yardımcı olmayı sorumluluğunuz olarak düşünüyor musunuz? Okul ve evdeki sorumluluklarınız sizce ne olmalıdır? Bu düşünceleriniz fen için de geçerli midir? Değilse, size göre sebepleri açıklayabilir misiniz?**

**Prompts:** Do you think that it is your responsibility to help your child with their homework or with their learning at home and at school? Do you think the same things for science? If no, can you explain why?

3. Can you tell me a little about what you do to support your child's learning at home? Do you help your child with their homework?

**C. Çocuğunuzun evdeki öğrenmelerinde olan yardımlarınız hakkında kısaca bilgi verebilir misiniz? Çocuğunuzun ödevlerine yardımcı oluyor musunuz?**

**Ders çalışmalarına ne gibi katkılar sağlıyorsunuz? Mesela fen dersi için ne yapıyorsunuz? Herhangi bir örnek verebilir misiniz? Hangi ödevlerine yardımcı olabiliyorsunuz? Bununla ilgili örnek verebilir misiniz? Sizce çocuğunuzun derslerdeki başarısını arttırabilir misiniz? Ne gibi metotlar kullanarak bu başarıyı sağlayabilirsiniz? Çocuğunuzun derslerine yardımcı olabilecek ne tür kaynakları kullanıyorsunuz? Çocuğunuzun okulda öğrendiği dersler veya konular hakkında bilginiz oluyor mu? Oluyorsa örnek verebilir misiniz?**

**Prompts:** How do you support your child's learning in general? What about science? (For parents who give positive answer) How do you think you could improve your child's success in their lessons in general? Are you able to find resources to help your child's learning? If yes, where do you find these? Can you tell me more about this? What kind of homework do you feel most comfortable helping with? Can you give me an example for this? What about science homework? Can you give me an example about what your child's is learning in their lessons?

4. Has your child asked you for any help with their homework or explained to you what they are learning in school? If yes, can you tell me more; if no, can you tell me why?

**D. Çocuğunuz dersleri veya ödevleri konusunda sizden herhangi bir yardım istedi mi? Veya okulda öğrendiği konularla ilgili bir şeyler açıkladı mı? Mesela ne tür şeyler istedi veya açıkladı? Örnek verebilir misiniz? İstemediye, sizce bir sebebi var mıdır?**

**Prompts:** Has your child wanted any help with their homework?

APPENDIX H CONTUNIED:

5. Have any of your child's teachers asked you (or explained to you how) to support your child's learning? If yes, what did the teacher want you to do? If no, do you think communication with teacher would have been useful?

**E. Çocuğunuzun herhangi bir öğretmeni, çocuğunuzun dersleri veya ödevlerine yardım etmenizi istedi mi? Veya nasıl yardım etmeniz gerektiğini sizlere açıkladı mı? İstediye, ne istemişti?**

**Prompts:** Has the teacher asked you to help your child with their homework? Does the teacher explained to you how to help your child's learning?

6. Now I want to ask you a question regarding your computer and internet skills. Can you use the computer to do basic tasks (opening word document, send an email)? What about using the internet? Do you use the internet to support your child's learning?

**F. Şimdi de yapmayı planladığım bir programla ilgili olarak bilgisayar ve internet kullanımınızla ilgili bir soru sormak istiyorum. Bilgisayar da Word dosyası açma, mail gönderme, internette gezme gibi işlemleri yapabiliyor musunuz?**

**Prompts:** Do you know how to send email? What do you use email for? Have you ever used a learning website?

7. Do you generally communicate with your child's school and teachers? If yes, how often do you communicate and how do you communicate? If no, why do you not communicate?

**Prompts:** What about the science teacher?

**G. Çocuğunuzun okul ve öğretmenleriyle ne sıklıkla görüşüyorsunuz? Bu görüşmeler için genellikle hangi yolları kullanırsınız? Fen öğretmeniyle iletişiminiz nasıldır?**

8. In the previous question, I asked you about your involvement in your child's learning. Now, I want to ask you about science learning. How important do you think is the learning of science for your child?

**H. Genellikle çocuğunuzun eğitime katılımınızla ilgili sorular sordum. Şimdide çocuğunuzun fen eğitimiyle ilgili bir soru sormak istiyorum. Çocuğunuzun okulda öğrendiği feni ne kadar önemli buluyorsunuz? Sizce çocuğunuza gelecekte ne gibi katkılar sağlayacaktır?**

9. Do you want to add anything about the ways in which parents might support their children with learning?

**I. Çocuklarının eğitiminde ailelerin katılımı konusunda eklemek istediğiniz herhangi bir şey var mı?**

## APPENDIX H CONTUNIED:

### Post Interview Questions:

1. How do you think your child's ideas about homework since being part of the project?
2. How do you think about your responsibilities for your child's learning since being part of the project?
3. How have you been able to support your child's learning? What worked best? What was most challenging?
4. How do you think your child experienced working with you on this project?
5. Can you tell me how you experienced communicating with the science teacher?
6. How have you used the computer and internet? What worked best? What was most challenging?
7. Can you tell me how you experienced working with science materials?
8. What are your ideas about science learning?

## **APPENDIX I: Parents' having a computer and an internet connection at their home**

In parental involvement questionnaire, an additional information was also asked to find out about whether parents had a computer, whether they had an internet connection at their home and, if so, do they have any restriction on their child's access to the internet. This was important because parents and their child will experience working together on the online learning website. Therefore, they needed to have a computer and internet connection at their home. The results are summarised in Table 1

Table 1: The demographics of having a computer and an internet connection at home across the school groups

	<b>Private School Parents</b>	<b>Public School Parents</b>	<b>Total</b>
<b>Have a computer at home (%)</b>	98	74	85
<b>Have an internet connection at home (%)</b>	87	61	74
<b>Have restrictions on internet access (%)</b>	87	92	89
<b>Total participants (N)</b>	95	107	202

According to the result presented in table 6.13, most of the parents (85%) had access to a computer and 74% of them had an internet connection at their home. Most of the parents (89%) who had internet connection at their home also restricted internet access for their children. In addition, having a computer and the internet connection at home across school groups were presented because most of the private school parents were expected to have a computer and an internet connection at their home prior of the study. Since the intervention based on the use of computer and the internet, the selection of the control and experimental groups parents from the private school parents eased the study because most of these parents had a computer (98%) and an internet connection (87) at their home when it compared to the public school parents who 74% of them had a computer and only 61% of them had an internet connection at their home. The results from the public school parents were similar to the general population of the Turkish families' having computer and an internet connection at their home. According to Turkish Statistical Institute (Turkstat), in 2014, 79% of the Turkish families had a computer at their home and 60.2% of the households had an internet access (Turkstat, 2014).

## APPENDIX J: Hoover-Dempsey and Sandler's parental involvement models

Hoover-Dempsey and Sandler's (1995, 1997) parental involvement model

Level 5

Student outcomes, including:	
Skills and knowledge	Self-efficacy for school success



Level 4

Tempering/mediating variables	
Parent's use of developmentally appropriate strategies	Fit between parent's involvement actions & school expectations



Level 3

Mechanisms of parent involvement's influence on child's school outcomes		
Modeling	Reinforcement	Instruction



Level 2

Parents' choice of involvement forms, influenced by:		
Parent's skills & knowledge	Other demands on parent's time and energy	Specific invitations from the child and school



Level 1

Parents' basic involvement decision, influenced by:			
Parent's role construction	Parent's sense of efficacy for helping the child	General school invitations for involvement	General child invitations for involvement

APPENDIX J CONTUNIED:

Hoover-Dempsey and Sandler's (2005) parental involvement model

**Level V**

Student Achievement
---------------------



**Level IV**

Student Attributes Conducive to Achievement			
Academic Self-Efficacy	Intrinsic Motivation to Learn	Self-Regulatory Strategy Use	Social Self-Efficacy Teachers



**Level III**

Mediated by Child Perceptions of Parent Mechanisms (Student Report)			
Encouragement	Modeling	Reinforcement	Instruction



**Level II**

Parent Mechanisms of Involvement (Parent Report)			
Encouragement	Modeling	Reinforcement	Instruction



**Level I**

Parent Choice of Involvement Activities							
Personal Motivation		Invitations			Life Context		
Parental Role Construction	Parental Efficacy	General School Invitations	Specific School Invitations	Specific Child Invitations	Knowledge and Skills	Time and Energy	

## APPENDIX K: Parental Involvement Questionnaire

### Your involvement in your child's science education

My name is Nihat Altinoz and I am a PhD student at the University of Leicester in the UK. I am interested in parents' involvement in their child's learning especially in science education. As part of my research I would like to find out more about how you are involved in your child's learning both in general and in science. The information will help researchers understand what parents do to support their child's learning and will help schools and teachers to support parents and students more effectively.

This questionnaire is about your Year Seven child. While you are answering the questions, please only tell us about this child. The information you will give will not be revealed to anyone other than the researcher, will be kept confidential and will only be used for the purpose of this study. Your child and their teachers will not have access to your responses. Your answers are very important for this study, so please think carefully while answering. Please tick the most appropriate box for your answer (see the example below) and please try to answer all questions.

The following question is an example that show you how to answer the questions in the questionnaire. Please see how it is answered and don't try to answer it.

	Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
I know what my child is learning at school.		✓			

When you finish, please check for any missing questions. After you have answered all the questions, please return the questionnaire with your child to the researcher.

**Thank you for your time and your valuable contribution to this study.**

## APPENDIX K CONTUNIED:

### Part I: Your general involvement in your child's learning

This section is about your involvement in your child's general learning.

Parents have many different beliefs about their level of responsibility for their child's education. Please respond to the following statements by indicating the degree to which you believe you are responsible.

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
	As a parent, I should...					
1.	...communicate with my child's teacher regularly.					
2.	...support the school's decisions about my child's learning.					
3.	...explain any homework my child finds difficult.					
4.	...make sure my child understands their homework.					
5.	...help with my child's learning at home.					
6.	...talk with my child about what they are learning at school.					
7.	....attend special events at school.					
8.	....attend parent-teacher meetings.					

People have different feelings about their own school experiences. Please answer the following statements by indicating how they best describe your feelings about **your school experiences when you were at same grade as your child is now.**

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
9.	I enjoyed my time at school.					
10.	I was successful at school.					
11.	My teachers liked me.					
12.	I felt my teachers cared about me.					



## APPENDIX K CONTINUED:

Now I want ask you about your confidence, knowledge and skills in helping your child's general learning. Please indicate how much do you **agree** or **disagree** with each of the following statements.

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
13.	I don't know how to support my child's learning.					
14.	I can make a significant difference in my child's school success.					
15.	I can explain some homework to my child.					
16.	I have enough knowledge about my child's school subjects to help with their homework.					
17.	I know what my child is learning in their lessons.					
18.	I am able to make use of daily life experiences (e.g. while at home or at the supermarket) to teach my child.					
19.	I know where to find resources to support my child's learning.					

Please read the following statements and indicate whether or not this has happened since **the beginning of this school year**.

		Yes	No	Can't remember
<b>Has any one of your child's teachers...</b>				
20.	.... asked you to help your child with their homework?			
21.	.... explained to you what your child is learning in their lessons?			
22.	.... asked you to talk with your child about their school day?			
23.	.... explained to you how to help with your child's learning?			
24.	.... asked you to attend a special event at school?			
25.	.... asked you to help out at the school?			
<b>My child...</b>				
26.	.... asked me to explain something about their homework.			
27.	.... talked with me about their school day.			
28.	.... asked me to help out at their school.			
29.	.....explained to me what they are learning in their lessons.			

## APPENDIX K CONTINUED:

### Part II: Your Involvement in Science Education

In this section, I want to find out about your involvement in science learning of your child.

You may have different beliefs about your responsibilities regarding your child's science learning.

For each of the following statements please indicate the best option that represents your belief.

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
	As a parent, I should...					
1.	...ask the science teacher about my child's progress.					
2.	...support the teacher's decisions about science education.					
3.	...help my child with their science learning at home.					
4.	...know what my child is learning in science.					

Please indicate how much you **agree** or **disagree** with each of the following statements that are about your confidence, skills and knowledge regarding your child's science learning.

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
5.	I don't know how to help my child's learning in science.					
6.	I can improve my child's achievement in science.					
7.	I have enough information about what my child is learning in science.					
8.	I can help some science homework of my child.					
9.	I can explain science subjects to my child.					
10.	I can find resources to help my child's learning in science.					
11.	I don't know how to explain science subjects to my child using real life examples.					

Please read the following statements and indicate whether or not this has happened since **the beginning of this school year**.

		Yes	No	Can't remember
	My child's science teacher....			
12.	.... wanted me to support my child's science homework.			
13.	.... informed me about what my child is learning in science.			
14.	.... helped me to support my child's science learning at home.			
	My child has...			
15.	.... asked me to help them with their science homework.			
16.	.... told me what they are learning in science.			

## APPENDIX K CONTUNIED:

### Part III: Your use of the internet in learning and communication with teachers

This section is about your communication with one of your child's teachers and your use of the internet to help your child's learning.

Please answer the following questions that are about your skills for the use of the internet.

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
1.	I am very confident at using the internet.					
2.	I know how to use a computer to do simple tasks such as opening a word file and web browsing.					
3.	I know how to use email.					
4.	I know how to use the internet to support my child's learning.					
5.	I can use a learning website to support my child's learning.					
6.	I know where to find resources on the internet to help my child's learning in science.					

Please answer to following yes/no questions that are about you and your child.

		Yes	No
7.	Do you have access to a computer at home? (If no go to question 11).		
8.	Does your child have a computer in their bedroom?		
9.	Do you have internet access in your home?		
10.	Does your child have any restriction on what they can access on the internet?		
11.	Does your child receive any private lessons for science?		

Please read the following statements and indicate whether or not this has happened since **the beginning of this school year.**

		Yes	No
<b>One of my child's teachers...</b>			
12.	.... explained to me how to use the internet to support my child's learning.		
13.	.... explained to me how to use learning websites to help my child's learning.		
14.	.... wanted me to use the internet to support my child's learning.		
<b>My child...</b>			
15.	.... asked me to use the internet to help with their science homework.		
16.	.... wanted me to do learning website's science activities together.		

## APPENDIX K CONTUNIED:

Now I want to find out about how you communicate with one of your child's teachers. Please read each of the following statements and tick the best option that suits you.

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
17.	I am able to use email to contact my child's teacher.					
18.	I am able to use the internet to get help from my child's teacher.					
19.	I have enough time to communicate with my child's teacher.					
20.	I am able to communicate with my child's science teacher.					

### Part IV: Your attitudes towards Science

Did you study science (e.g. physics, chemistry, biology) when you were at lower secondary school?

Yes ☐ No ☐ (If you answer "no", please start from question 6).

This section is about your feelings and attitudes about general science and science education. Please respond to the following statements by indicating the degree that best describes your feelings about **your school science experiences when you were at secondary school.**

		Strongly Agree	Agree	Disagree	Strongly disagree	Not sure
1.	I enjoyed science lessons.					
2.	I was good at science.					
3.	My science teachers didn't really help me.					
4.	Science was difficult for me.					

## APPENDIX K CONTUNIED:

Now I want to know about your attitudes towards science in everyday life. Please respond to the following statements by indicating how much you **agree** or **disagree** with each of the following statements.

		<b>Strongly Agree</b>	<b>Agree</b>	<b>Disagree</b>	<b>Strongly disagree</b>	<b>Not sure</b>
5.	I believe that science is useful in everyday life.					
6.	Science and technology are making our lives healthier, easier and more comfortable.					
7.	I do not have much interest in science.					
8.	I like to read about some scientific topics.					
9.	I find it difficult to understand scientific ideas.					
10.	I like to watch TV programs about science (e.g. documentaries).					
11.	I am good at science.					
12.	I like discussing scientific problems.					
13.	You have to be clever to study science.					
14.	The science I learnt at school has been useful in my job.					
15.	I would encourage my child to study science.					
16.	My child enjoys science.					
17.	My child does not have much interest in science.					
18.	My child sees science as being useful in everyday life.					
19.	My child enjoys discussing scientific topics.					
20.	My child is good at science.					
21.	My child will need to use science in their future job.					
22.	Knowing science will help my child to be more successful in life.					
23.	My child would like to study science at a more advanced level.					

APPENDIX K CONTUNIED:

**Part V: Your Information**

Please complete the following information.

**Your name:** .....

**Name of your child:** .....

**Is your job science related?**

Yes ☐ No ☐

**Your level of education:** (please tick the last level that you completed)

Postgraduate	
Undergraduate	
Upper secondary school	
Lower secondary school	
Primary school	
Other (please write)	
.....	

**Your gender:** Male ☐ Female ☐

**Your child's gender:** Male ☐ Female ☐

**Is your partner's job science related?**

Yes ☐ No ☐

**Your partner's level of education:** (please tick the last level that he/she completed).

Postgraduate	
Undergraduate	
Upper secondary school	
Lower secondary school	
Primary school	
Other (please write)	
.....	

**How many children do you have in total?** .....

**What is the birth order of your year six child?** .....

**Who usually helps your year six child with their homework or learning at home?**

.....

**Your email address (If you have one):**

.....

**Do you want to add anything else about your involvement in your science child's education or in their schooling more generally?**

.....  
.....  
.....  
.....

**THANK YOU VERY MUCH**



## APPENDIX L: An Example of a Completed Parental Involvement Questionnaire

### Çocuğunuzun Fen Eğitimine Katılımınız

Benim adım Nihat Altinoz, Milli Eğitim Bakanlığı bursuyla İngiltere'nin Leicester üniversitesinde Fen Eğitimi alanında doktora öğrenimimi yapmaktayım. Doktora çalışmam için çocukların fen eğitiminde ailelerinin katılımları ile ilgili bir araştırma yapmaktayım. Çalışmamın bir bölümü olarak çocuğunuzun hem fen eğitimi hem de genel eğitimindeki katılımınızla ilgili bilgi toplamak istiyorum. Toplayacağım bu bilgi bana ve diğer araştırmacılara, çocukların eğitimine katılımda ailelerin katılım düzeylerinin daha iyi anlaşılmasına yardımcı olacaktır. Bu da öğrenci ve ailelere, okul ve öğretmenlerden daha etkili bir desteğin verilmesine yardımcı olacaktır.

Bu anket, anketi size getiren çocuğunuzla ilgilidir. Buradaki soruları yanıtlarken lütfen sadece bu çocuğunuz hakkında bilgi veriniz. Vereceğiniz bilgi araştırmacıdan başka hiç kimseye paylaşılmayarak gizli kalacak ve sadece bu araştırmanın amacı doğrultusunda kullanılacaktır. Çocuğunuz ve çocuğunuzun öğretmenleri sizin yanıtlarınızı hiçbir şekilde görmeyecektir. Yanıtlarınız bu araştırma için çok önemlidir, bu nedenle lütfen soruları yanıtlarken dikkatli olunuz. Lütfen diğer sayfalarındaki soruları size en uygun olan yanıtı gösterecek şekilde yanıtlayınız. Aşağıdaki soru, diğer soruları nasıl yanıtlamanızı göstermek içindir. Lütfen diğer soruları aşağıdaki örnekte gösterildiği gibi işaretleyip yanıtlayınız.

	Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
Çocuğumun okulda ne öğrendiğini biliyorum.		✓			

Lütfen anketi bitirdiğinizde, yanıtlayamadığınız sorular için anketi kontrol ediniz. Bütün soruları cevapladığınızda lütfen anketi zarfa koyarak zarfın ağzını kapatınız. Lütfen kapatılmış zarfı, çocuğunuz aracılığıyla istenen zamana kadar okula geri gönderiniz. Sormak istediğiniz herhangi bir sorunuz olursa aşağıdaki iletişim bilgilerinden bana ulaşabilirsiniz.

Bu çalışmaya ayırdığınız zaman ve katkılarınız için şimdiden teşekkür ederim.

Saygılarımla,

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## APPENDIX L CONTUNIED:

### Bölüm 1: Çocuğunuzun genel eğitimine katılımınız

Bu bölüm çocuğunuzun genel eğitimindeki katılımınızla ilgilidir.

Veliler çocuklarının eğitimindeki sorumlulukları hakkında çok farklı düşüncelere sahiptirler. Lütfen aşağıdaki ifadeleri, sorumlu olduğunuza inandığınız dereceyi gösterecek şekilde yanıtlayınız.

		Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
Bir veli olarak,...						
1.	...çocuğumun öğretmeniyle düzenli bir şekilde iletişim kurmalıyım.		✓			
2.	...okulun, çocuğumun eğitimi ile ilgili aldığı kararları desteklemeliyim.	✓				
3.	...çocuğuma, zor bulduğu ödevlerini açıklamalıyım.	✓				
4.	...çocuğumun ödevlerini anladığına emin olmalıyım.	✓				
5.	...çocuğumun evdeki eğitimine yardımcı olmalıyım.	✓				
6.	...çocuğumla okulda öğrendikleri hakkında konuşmalıyım.	✓				
7.	...okuldaki özel bir etkinliğe katılmalıyım.	✓				
8.	...okul toplantılarına katılmalıyım.	✓				

İnsanlar kendi okul deneyimleri ile ilgili olarak farklı düşüncelere sahiptirler. Lütfen aşağıdaki ifadeleri, düşüncelerinizi en güzel gösterecek şekilde yanıtlayınız. Lütfen çocuğunuzla **aynı sınıfta olduğunuz zamanki okul deneyimlerinizi** göz önünde bulundurunuz.

		Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
9.	Okulumda geçirdiğim zamandan hoşlanmıştım.	✓				
10.	Okulumda başarılıydım.		✓			
11.	Öğretmenlerim beni severdi.	✓				
12.	Öğretmenlerimin benimle ilgilendiğini hissedirdim.	✓				



# APPENDIX L CONTUNIED:

Şimdi de çocuğunuzun genel eğitimine katkılarınızla ilgili olarak kendinize olan güveniniz, bilginiz ve becerilerinizle ilgili sorular sormak istiyorum. Lütfen aşağıdaki her ifadeye ne kadar katılıp katılmadığınızı gösteriniz.

	Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
13. Çocuğumun eğitimine nasıl destek vereceğimi <u>bilmiyorum</u> .		✓			
14. Çocuğumun derslerindeki başarısında önemli bir değişiklik yapabilirim.	✓				
15. Çocuğumun ödevlerine yardımcı olurum.	✓				
16. Çocuğumun ödevlerine yardımcı olabilmem için gerekli konu bilgisine sahibim.	✓	✓			
17. Çocuğumun derslerinde ne öğrendiğini biliyorum.	✓				
18. Gündelik hayattan örnekler kullanarak, çocuğumun derslerine katkıda bulunurum.	✓				
19. Çocuğumun eğitimine yardımcı olabilecek kaynakları nerede bulacağımı biliyorum.	✓				

Lütfen aşağıdaki her ifadeyi **bu okul yılının başından buyana** geçen zamanı dikkate alarak cevaplayınız.

	Evet	Hayır	Hatırlamıyorum
Çocuğumun öğretmenlerinden biri...		✓	
20. ...çocuğumun ödevlerine yardım etmemi istedi.		✓	
21. ...çocuğumun derslerinde ne öğrendiğini açıkladı.	✓		
22. ...çocuğumla okulundaki günü ile ilgili konuşmamı istedi.	✓		
23. ...çocuğumun eğitimine nasıl yardımcı olacağımı açıkladı.	✓		
24. ...okuldaki özel bir etkinliğe katılmamı istedi.			✓
25. ...okula yardımcı olmamı istedi.			✓
Çocuğum...			
26. ...benden ödevi hakkında bir şeyleri açıklamamı istedi.	✓		
27. ...benimle okuldaki günü hakkında konuştu.	✓		
28. ...benden okula yardım etmemi istedi.		✓	
29. ...bana derslerinde ne işlediklerini açıkladı.	✓		

## APPENDIX L CONTUNIED:

### Bölüm 2: Çocuğunuzun fen öğrenimine katılımınız

Bu bölümde, çocuğunuzun fen öğrenimindeki katılımınızı bulmak istiyorum.

Çocukluklarının fen öğrenimine yönelik sorumluluklarında veliler, farklı düşüncelere sahip olabilirler. Aşağıdaki her ifadeyi düşüncelerinizi en iyi yansıtacak şekilde yanıtlayınız.

		Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
Bir veli olarak,...						
1.	...çocuğumun fen derslerindeki durumunu fen öğretmenine sormalıyım.	✓				
2.	...fen öğretmenin, fen eğitimi ile ilgili aldığı kararları desteklemeliyim.	✓				
3.	...çocuğumun fen eğitimine evde yardımcı olmalıyım.	✓				
4.	...çocuğumun okulda fenle ilgili ne öğrendiğini bilmeliyim.	✓				

Aşağıdaki sorular çocuğunuzun fen öğrenimiyle ilgili kendinize olan güveniniz, becerileriniz ve bilginizle ilgilidir. Lütfen aşağıdaki her ifadeye ne kadar katılıp katılmadığınızı gösteriniz.

		Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
5.	Çocuğumun fen derslerini nasıl destekleyeceğimi <u>bilmiyorum</u> .			✓		
6.	Çocuğumun fendeki başarısını arttırabilirim.	✓				
7.	Çocuğumun fen derslerinde ne öğrendiğini biliyorum.		✓			
8.	Çocuğumun bazı fen ödevlerine yardımcı olabilirim.		✓			
9.	Çocuğuma fen konularını açıklayabilirim.		✓			
10.	Çocuğumun fen konularını, günlük hayattan örnekler kullanarak açıklayabilirim.		✓			
11.	Çocuğumun fen eğitimine yardımcı olacak kaynakları bulabilirim.		✓			

Lütfen aşağıdaki her ifadeyi **bu okul yılının başından bu yana** geçen zamana göre cevaplayınız.

		Evet	Hayır	Hatırlamıyorum
	Çocuğumun fen öğretmeni, çocuğumun...			
12.	...fen ödevlerini desteklememi istedi.	✓		
13.	...fende ne öğrendiğiyle ilgili beni bilgilendirdi.	✓		
14.	...evdeki fen öğrenimini desteklemede bana yardım etti.	✓		
	Çocuğum...			
15.	...benden fen ödevine yardımcı olmamı istedi.	✓		
16.	...fende ne öğrendiklerini bana açıkladı.	✓		



APPENDIX L CONTUNIED:

**Bölüm 3: Çocuğunuzun öğreniminde internet kullanımınız ve öğretmenlerle iletişiminiz**

Bu bölüm çocuğunuzun herhangi bir öğretmeniyle olan iletişiminiz ve çocuğunuzun öğrenmesine yardımcı olmada internet kullanmanızla ilgilidir.

Lütfen internet kullanım becerilerinizle ilgili aşağıdaki soruları yanıtlayınız.

		Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
1.	İnternet kullanımı ile ilgili olarak kendime güveniyorum.	✓				
2.	Word dosyası açma veya internette gezme gibi basit bilgisayar işlerini nasıl yapacağımı biliyorum.		✓			
3.	İnternet üzerinden nasıl mail atılacağını biliyorum.	✓				
4.	İnterneti, çocuğumun eğitimini desteklemede nasıl kullanacağımı biliyorum.	✓				
5.	Online eğitim sitelerini, çocuğumun öğrenimini desteklemek için kullanabilirim.	✓				
6.	İnternette, çocuğumun fen öğrenmesine yardımcı olabilecek kaynakları nerede bulacağımı biliyorum.	✓				

Kendiniz ve çocuğunuzla ilgili olan aşağıdaki soruları lütfen yanıtlayınız.

		Evet	Hayır
7.	Evinizde herhangi bir bilgisayar var mı? (yoksa 11. sorudan devam ediniz).	✓	
8.	Çocuğunuzun odasında bilgisayar var mı?		✓
9.	Evinizde internete ulaşımınız var mı?	✓	
10.	Çocuğunuzun interneti kullanmasıyla ilgili herhangi bir kısıtlama var mı?	✓	
11.	Çocuğunuz fenle ilgili özel bir ders alıyor mu?		✓

Lütfen aşağıdaki her ifadeyi, **bu okul yılının başından bu yana** geçen zamanı dikkate alarak cevaplayınız.

		Evet	Hayır	Hatırlamıyorum
	Çocuğumun öğretmenlerinden biri...			
12.	...interneti, çocuğumun eğitimini desteklemek için nasıl kullanacağımı açıkladı.	✓		
13.	...çocuğumun eğitimine yardımcı olmak için, online eğitim sitelerini nasıl kullanmam gerektiğini açıkladı.	✓		
14.	...interneti kullanarak, çocuğumun eğitimini desteklememi istedi.		✓	

## APPENDIX L CONTUNIED:

Lütfen aşağıdaki her ifadeyi, **bu okul yılının başından bu yana** gecen zamanı dikkate alarak cevaplayınız.

Çocuğum benden...	Evet	Hayır	Hatırlamıyorum
15. ...fen ödevlerine yardımcı olmam için interneti nasıl kullanacağını sordu.		<input checked="" type="checkbox"/>	
16. ...benden online eğitim sitesindeki fen aktivitelerini birlikte yapmamızı istedi.			<input checked="" type="checkbox"/>

Şimdi çocuğunuzun öğretmenlerinden herhangi biriyle olan iletişiminizle ilgili olarak sorular sormak istiyorum. Lütfen aşağıdaki her ifadeyi okuyup, size en uygun seçeneği işaretleyiniz.

	Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
17. İnternet üzerinden mail kullanarak çocuğumun öğretmeniyle iletişim kurabilirim.	<input checked="" type="checkbox"/>				
18. İnterneti kullanarak çocuğumun öğretmeninden yardım alabilirim.	<input checked="" type="checkbox"/>				
19. Çocuğumun öğretmeniyle iletişime geçecek yeterli zamana sahip değilim.	<input checked="" type="checkbox"/>				
20. Çocuğumun fen öğretmeniyle iletişime geçebilirim.	<input checked="" type="checkbox"/>				

### Bölüm 4. Fene yönelik tutumunuz

**Ortaokuldayken** fenle ilgili (fizik, kimya, biyoloji gibi) herhangi bir ders aldınız mı?

Evet ☐ Hayır ☐ ( yanıtınız “hayır” ise, lütfen 6. sorudan başlayınız).

Bu bölüm fen ve fen eğitimi ile ilgili tutum ve düşüncelerinizle ilgilidir. Lütfen aşağıdaki ifadeleri, düşüncelerinizi en güzel gösterecek şekilde yanıtlayınız. Lütfen **çocuğunuzla aynı sınıfta olduğunuz zamandaki okul deneyimlerinizi** göz önünde bulundurunuz.

	Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
1. Fen derslerinden hoşlanırdım.			<input checked="" type="checkbox"/>		
2. Fen derslerinde iyiydim.			<input checked="" type="checkbox"/>		
3. Fen öğretmenim bana yardımcı olmazdı.			<input checked="" type="checkbox"/>		
4. Fen benim için zordu.			<input checked="" type="checkbox"/>		



APPENDIX L CONTUNIED:

Şimdi günlük yaşamdaki fene yönelik tutumunuzu öğrenmek istiyorum. Lütfen aşağıdaki her ifadeye, ne kadar katılıp katılmadığınızı gösterecek şekilde yanıtlayınız.

		Kesinlikle katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle katılmıyorum	Emin değilim
5.	Fenin günlük hayatta kullanışlı olduğuna inanırım.	✓				
6.	Fen ve teknoloji, hayatımızı daha sağlıklı, daha kolay ve daha konforlu yapmaktadır.	✓				
7.	Fene yönelik herhangi bir ilgiye sahip değilim.		✓			
8.	Fenin bazı alt dalları ile ilgili konuları (sağlık, teknoloji, fizik, çevre vb.) okumak hoşuma gider.					✓
9.	Bilimsel fikirleri anlamakta zorlanırım.					✓
10.	Fenle ilgili televizyon programlarını izlemekten hoşlanırım (belgesel gibi).				✓	
11.	Fende iyiyimdir.			✓		
12.	Bilimsel konuları tartışmaktan hoşlanırım.		✓			
13.	Fen çalışmak için zeki olmak gerekir.	✓				
14.	Okulda öğrendiğim fen, şimdiki işimde kullanışlı oldu.	✓				
15.	Çocuğumun fen çalışmasını teşvik ederim.		✓			
16.	Çocuğum fenden hoşlanır.	✓				
17.	Çocuğum fene yönelik herhangi bir ilgiye sahip değildir.			✓		
18.	Çocuğum feni günlük hayatta kullanışlı olarak görüyor.	✓				
19.	Çocuğum bilimsel konuları tartışmaktan hoşlanır.		✓			
20.	Çocuğum fende iyidir.		✓			
21.	Gelecekteki işinde çocuğumun, feni kullanması gerekecektir.	✓				
22.	Feni bilmesi, çocuğumun hayatında daha başarılı olmasına yardımcı olacaktır.	✓				
23.	Çocuğum ileride daha fazla fen çalışmak istiyor.	✓				

## APPENDIX L CONTUNIED:

### Bölüm 4: Bilgileriniz

Lütfen sizinle ilgili olan bu kısmı doldurunuz.

Adınız: [Redacted] .....

Cinsiyetiniz: Bay ☒ Bayan ☐

İşiniz fenle ilişkili mi?

Evet ☐ Hayır ☒

Eğitim seviyeniz: (lütfen en son tamamladığınız okul seviyenizi işaretleyiniz)

Lisansüstü	
Lisans	<input checked="" type="checkbox"/>
Lise	
Ortaokul	
İlkokul	
Diğer (lütfen yazınız)	

Çocuğunuzun adı: [Redacted] .....

Çocuğunuzun cinsiyeti: Erkek ☐ Kız ☒

Eşinizin işi fenle ilişkili mi?

Evet ☐ Hayır ☒

Eşinizin eğitim seviyesi: (lütfen en son tamamladığı okul seviyesini işaretleyiniz)

Lisansüstü	
Lisans	<input checked="" type="checkbox"/>
Lise	
Ortaokul	
İlkokul	
Diğer (lütfen yazınız)	

Toplamda kaç çocuğunuz var? ...3...

Çocuğunuzun doğum sırası nedir? ...2...

Çocuğunuzun evdeki öğrenmelerine veya ödevlerine genel olarak kim yardımcı olur?

...Annesi, bende ben...

Varsa mail adresiniz: [Redacted]@gmail.com

Çocuğunuzun fen veya genel eğitimine katılımınızla ilgili olarak eklemek istediğiniz bir şeyler var mı?

Öğretmeni severse, fenle sever. Öğretmen Fen Lisesi'nin herkeste işe yarayacağını anlatmış. Merak uyandırmış. Ayrıca çocuğa derste deney imlemleri sunulması önemli. Böylece gerçekleştirebiliriz öğrenmelerini.

ANKETİ TAMAMLADIĞINIZ İÇİN ÇOK TEŞEKKÜR EDERİM

Ben teşekkür ederim

## APPENDIX M: Children's attitudes towards science questionnaire

### Your Ideas about Science Learning

<b>Name</b>	.....
<b>Gender</b>	Male <input type="checkbox"/> Female <input type="checkbox"/>
<b>Age</b>	.....
<b>Class</b>	.....
<b>Today's date</b>	.....

Dear student;

Students have many different ideas about the scientific world and about how science is learnt in school. I would like to know about your ideas because they will help me and other researchers to better understand about how children learn science and this will help parents and teachers support children more effectively.

The following questions ask your ideas about your interest towards science learning, learning science in school, your ability in science, science out of school, your interest in science related careers and the importance of science in everyday life.

Please answer each question by putting a tick in the box that represents how true each question is to you (see the example below).

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
I like science.				✓	

Don't forget, each question has only one answer and tick the truest answer about you. Please, be careful to not miss any questions. The information you give me will be kept confidential.

Thank you very much.

## APPENDIX M CONTUNIED:

First I want to find out about your interest towards science learning. Please tick the most appropriate answer about you by indicating how much do you **agree** or **disagree** with each of the following statements.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
1.	I find it is easy to concentrate in science lessons.					
2.	I find it is easy to understand science topics.					
3.	I can explain science topics in my own words.					
4.	I find it is easy to relate the last science lessons with previous lessons.					
5.	I revise science lessons daily at home.					
6.	I follow a regular plan to study science subject(s) at home.					
7.	I complete science homework before going out to play.					

Now I want to ask about your ideas regarding learning science in school. Please read and indicate how much you agree or disagree about each question by ticking truest answer for you.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
8.	We learn interesting things in science lessons.					
9.	I look forward to my science lessons.					
10.	Science lessons are exciting.					
11.	I want to do more science at school.					
12.	I like science better than most other subjects.					
13.	Science is boring.					



## APPENDIX M CONTUNIED:

Thinking about your ability in science, to what extent do you agree or disagree with the following statements.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
14.	I find science difficult.					
15.	I am just not good at science.					
16.	I get good marks in science.					
17.	I learn science quickly.					
18.	Science is one of my best subjects.					
19.	I feel helpless when learning science.					

Thinking about your ideas about science outside of school, to what extent do you agree or disagree with the following statements.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
20.	I would like to join a science club.					
21.	I like watching science programmes on TV (e.g. documentaries).					
22.	I would like to do more science activities outside school.					
23.	I like reading science magazines and books.					
24.	It is exciting to learn about new things happening in science.					

## APPENDIX M CONTUNIED:

The following statements are about your interest in science related careers. Please read and indicate how much you agree or disagree about each question by ticking truest answer to you.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
25.	I would like to study more science in the future.					
26.	I would like to study science at university.					
27.	I would like to have a science related job.					

Thinking about the importance of science in everyday life, to what extent do you agree or disagree with the following statements.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
28.	Science are important for society.					
29.	Science make our lives easier and more comfortable.					
30.	The benefits of science are greater than any harmful effects.					
31.	Science and technology are helping the poor.					
32.	There are many exciting things happening in science and technology.					

The following statements are about your ideas regarding your family. Please read and indicate how much you agree or disagree about each question by ticking truest answer to you.

		<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>	<b>Not sure</b>
33.	I think my mother likes science.					
34.	I think my father likes science.					
35.	I think my brothers and/or sisters like science.					
36.	My family likes to watch science programs on TV.					

## APPENDIX N: An example of completed children's attitudes towards science by a student:

### Fen Eğitimi Hakkındaki Görüşleriniz

İsminiz:	.....
Cinsiyetiniz:	Erkek <input checked="" type="checkbox"/> Kız <input type="checkbox"/>
Sınıfınız:	7/C .....

Sevgili öğrenci,

Her öğrencinin bilim dünyası ve okulda öğrendiği fenle ilgili farklı düşünceleri vardır. Sizlerin bu konulardaki düşüncelerinizi öğrenmek istiyorum. Bu düşünceleriniz hem bana hem de birçok araştırmacıya öğrencilerin feni nasıl öğrendikleriyle ilgili önemli bilgi verecektir. Bu bilgi sizin ve diğer öğrencilerin fen eğitimlerine, aile ve öğretmenlerinden daha etkili destek almalarına yardımcı olacaktır.

Aşağıdaki sorular fen öğrenmeye karşı olan ilginiz, okulda fen öğreniminiz, fende ki yeteneğiniz, okul dışındaki fen, fenle ilgili kariyerle ilginiz ve fenin günlük hayattaki önemiyle ilgili düşüncelerinizi araştırmak için sorulmuştur.

Lütfen diğer sayfalarındaki her soruyu size göre en doğru olacak şekilde yanıtlayınız. Aşağıdaki soru örnek olunması için verilip yanıtlanmıştır. Lütfen sorunun nasıl yanıtlandığına bakarak diğer soruları da örnekte gösterildiği gibi kutucuğun içine bir tik koyarak yanıtlayınız.

	Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
Feni severim.			✓		

Her sorunun yalnızca bir yanıtının olduğunu ve size göre en doğru olan yanıtı işaretlemeniz gerektiğini unutmayınız. Lütfen hiçbir soruyu kaçırmamaya dikkat ediniz. Şunu unutmayın ki yanıtlarınız gizli tutulacak ve araştırmacıdan başka kimseye de gösterilmeyecektir.

Anketi dikkatli bir şekilde doldurduğunuz için çok teşekkür ederim.

## APPENDIX N CONTUNIED:

İlk olarak fen öğrenmeye karşı olan ilginizi araştırmak istiyorum. Lütfen aşağıdaki ifadelerin her birine ne kadar katılıp katılmadığınızı göstererek, size en uygun olan yanıtı işaretleyiniz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
1.	Fen derslerine kolay odaklanırım.		✓			
2.	Fen konularını kolay anlarım.		✓			
3.	Fen konularını kendi cümlelerimle açıklayabilirim.					✓
4.	Daha önce öğrendiğim fen konularını, yeni öğrendiklerimle ilişkilendirebilirim.	✓				
5.	Fen derslerini evde günlük olarak tekrar ederim.	✓				
6.	Fen dersime, düzenli bir plana göre çalışırım.	✓				
7.	Oyun oynamaya gitmeden önce fen ödevlerimi tamamlarım.					✓

Şimdi de okulda öğrendiğiniz fenle ilgili düşüncelerinizi sormak istiyorum. Lütfen aşağıdaki her soruyu ne kadar katılıp katılmadığınızı gösterecek şekilde okuyarak size göre en doğru olan yanıtı işaretleyiniz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
8.	Fen derslerinde ilgi çekici şeyler öğreniyoruz.	✓				
9.	Fen derslerini sabırsızlıkla beklerim.		✓			
10.	Fen konuları heyecan vericidir.	✓				
11.	Okulda daha fazla fen öğrenmek istiyorum.	✓				
12.	Feni diğer derslere göre daha fazla seviyorum.	✓				
13.	Fen sıkıcıdır.				✓	

## APPENDIX N CONTUNIED:

Fenle ilgili yeteneklerinizi düşündüğünüzde, aşağıdaki ifadelere ne kadar katılıp katılmadığınızı gösteriniz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
14.	Feni zor buluyorum.					✓
15.	Fende iyi değilim.				✓	
16.	Fende iyi not alırım.	✓				
17.	Feni hızlı öğrenirim.					✓
18.	Fen benim en iyi olduğum alanlardan biridir.		✓			
19.	Fen öğrenirken zorlanırım.		✓			

Okul dışındaki fenle ilgili düşüncelerinizi göz önüne aldığınızda, aşağıdaki ifadelere ne kadar katılıp katılmıyorsunuz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
20.	Bir fen kulübüne katılmak isterim.	✓				
21.	Fenle ilgili televizyon programlarını izlemeyi severim (örneğin, belgesel).	✓				
22.	Okul dışında fenle uğraşmak isterim.	✓				
23.	Fenle ilgili kitap ve dergileri okumayı severim.	✓				
24.	Bilim dünyasında yeni olan şeyleri öğrenmek heyecan vericidir.	✓				

Aşağıdaki ifadeler fenle ilgili kariyer planlarınızla alakalıdır. Lütfen aşağıdaki her soruyu ne kadar katılıp katılmadığınızı gösterecek şekilde okuyup, size göre en doğru olan yanıtı işaretleyiniz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
25.	Gelecekte daha fazla fen çalışmak istiyorum.	✓				
26.	Üniversitede fenle ilgili bir alanda okumak istiyorum.	✓				
27.	Fenle ilgili bir işe (doktor, mühendis, bilim insanı, hemşire gibi) sahip olmak isterim.	✓				



APPENDIX N CONTUNIED:

Fenin günlük hayattaki önemini düşündüğünüzde, aşağıdaki ifadelere ne kadar katılıp katılmadığınızı gösteriniz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
28.	Fen toplum için önemlidir.	✓				
29.	Fen yaşamımızı daha kolay ve konforlu yapmaktadır.					✓
30.	Fen fakirlere yardım edebilir.	✓				
31.	Fende çok heyecan verici şeyler oluyor.	✓				

Aşağıdaki ifadeler ailenizin fenle ilgili düşünceleriyle alakalıdır. Lütfen aşağıdaki her soruyu ne kadar katılıp katılmadığınızı gösterecek şekilde okuyup size göre en doğru olan yanıtı işaretleyiniz.

		Kesinlikle Katılıyorum	Katılıyorum	Katılmıyorum	Kesinlikle Katılmıyorum	Emin değilim
32.	Annemin feni sevdiğini düşünüyorum.					✓
33.	Babamın feni sevdiğini düşünüyorum.	✓				
34.	Kardeşlerimin feni sevdiklerini düşünüyorum.	✓				
35.	Ailem televizyonda fenle ilgili programları izlemeyi severler.	✓				

ÇOK TEŞEKKÜR EDERİM ☺☺

## APPENDIX O: Weekly feedback form

**Your name:**

**Date:**

Thank you for completing the weekly activities with your child. Please read and answer the following questions and statements.

1. Did you manage to finish all the activities? Yes ☐ No ☐ (If no, can you explain why?) .....

		Yes	No	Not sure
1.	I enjoyed the website activities.			
2.	The website activities were informative.			
3.	The website activities were interesting.			
4.	They were beneficial for me.			
5.	My child liked all the activities.			
6.	The website activities were easy to follow and to understand.			
7.	I was able to help my child with their homework.			
8.	I learned interesting things about science.			
9.	The activities provided all the information I needed to help my child.			
10.	I asked the teacher for more help by email.			
11.	I was able to do what the teacher wanted me to do.			
12.	Did you do any preparation prior to starting the homework activities?			

2. Did you do any preparation before doing the activities with your child?

.....

3. Did you experience any problems? If so, can you explain what they were?

.....

.....

4. How much time did the activities take? .....

5. Can you explain what you liked or disliked about the activities?

.....

.....

6. Do you want to add anything else?

.....

.....

## APPENDIX P: Example of a completed weekly feedback form by a parent in Turkish:

### Birlikte Fen Çalışım Programı - Haftalık Geribildirim Formu

Adınız: [REDACTED]

Tarih: 19.03.2014

Haftalık aktiviteleri çocuğunuzla birlikte tamamladığınız için çok teşekkür ederim. Lütfen aşağıdaki soru ve ifadeleri okuyup yanıtlayınız.

1. Haftalık aktivitelerin tümünü çocuğunuzla birlikte yapabildiniz mi?

Evet ☒ Hayır ☐ (Yanıtınız hayırsa, aktiviteleri bitirememenizin nedenini açıklayabilir misiniz?)

	Evet	Hayır	EminDeğilim
İnternet sitesindeki aktiviteler hoşuma gitti.	X		
İnternet sitesindeki aktiviteler bilgilendiriciydi.	X		
İnternet sitesindeki aktiviteler ilgi çekiciydi.	X		
Aktiviteler benim için faydalı oldu.	X		
Çocuğum aktivitelerden hoşlandı.	X		
İnternet sitesindeki aktiviteler takip edilmesi kolay ve anlaşılırdı.	X		
Çocuğuma yardımcı olabildim.	X		
Fenle ilgili ilgi çekici şeyler öğrendim.	X		
Aktiviteler, çocuğuma gerekli yardımı vermem için yeterli bilgileri içeriyordu.	X		
Öğretmenden mail kullanarak yardım istedim.		X	
Öğretmenin benden yapmamı istediği şeyleri yapabildim.	X		

2. Çocuğunuzla aktiviteleri yapmaya başlamadan önce herhangi bir ön hazırlık yaptınız mı?

Hayır. Sadece uygulayacak olan bu programı anlattım.

3. Aktiviteleri yaparken herhangi bir sorunla karşılaştınız mı? Karşılaştıysanız, ne gibi sorunlarla karşılaştınız?

Karşılaşmadık.

4. Bütün aktiviteleri yapmanız ne kadar zamanınızı aldı? Yarım saat.

5. Aktivitelerle ilgili hoşunuza giden veya gitmeyen şeyleri açıklayabilir misiniz?

Aktivitelerin kısa ve kanuların ayrı video programında olması güzeldi. Çünkü her konunun sonrası çarpışa anlatılmasına imkan oluyor ve çocuk sıkılmıyor.

6. Ekleme istediğiniz başka bir şeyler var mı?



## APPENDIX R: Parents' and Children's Open-Ended Questionnaires

### Your child's studying at home (for Parents)

**Your gender:** Male/Female

**Your Child's Class:** .....

1. Can you explain me about your child's study plan at home?  
.....  
.....
2. What your child generally does when she/he don't study?  
.....  
.....
3. Can you explain the factors that prevent your child's study at home?  
.....  
.....
4. What can be done to make your child to study better at home?  
.....  
.....  
.....
5. What are you doing to make your child to study effectively at home?  
.....  
.....
6. Which responsibilities should you have regarding your child's learning?  
.....  
.....
7. What are you doing to support your child's learning?  
.....  
.....  
.....
8. How can you do to improve your child's success?  
.....  
.....
9. What are your expectations from us in order to improve your child's success?  
.....  
.....

## **Your Studying at Home (for Children)**

**Your gender:** Boy/Girl

**Your Class:** .....

1. Can you explain your study plan that you follow at home?  
.....  
.....
2. What are you doing when you don't study?  
.....  
.....
3. Can you explain the factors that prevent your study at home?  
.....  
.....
4. What can be done to improve your effective studying at home?  
.....  
.....
5. Regarding your studying at home:
  - a) What your parents do?  
.....  
.....
  - b) What would like your parents do?  
.....  
.....
  - c) What would not like your parents do?  
.....  
.....
6. What are your expectations from us in order to improve your success?  
.....  
.....  
.....

## APPENDIX S: Examples of completed Parents' and Children's Open-Ended Questionnaire

### A) Parents' open-ended questionnaire

ÇOCUĞUNUZUN DERS ÇALIŞMASI	
Cinsiyetiniz: Bay <input type="checkbox"/> Bayan <input checked="" type="checkbox"/>	Çocuğunuzun Sınıfı: 7/E
1. Çocuğunuzun evdeki ders çalışma sistemi hakkında bilgi verir misiniz? Dersteki saatler fazla çalışmıyor. Onu sürekli ders çalışması için teşvik ediyorum. Yani özel odası olmadıkça ders fazla çalışmıyor.	
2. Çocuğunuz ders çalışmadığı zaman genellikle ne yapar? Televizyon seyreder, kardeşlerini oynatır, evin varsa diğer parçaları çizer ve bilgisayarla ilgilenir.	
3. Çocuğunuzun evde ders çalışmasını engelleyen durumlar sizce nelerdir? Bence kendine ait bir odası olmaması, evde ses, televizyon, internet ve misafirlerin olması ve bu arkadaşları engelliyor.	
4. Çocuğunuzun evde verimli ders çalışabilmesi için sizce ne yapılmalıdır? Özellikle kendine ait odası, internet ve televizyonun evden uzak olması ve dersleri için onu birinin teşvik etmesini özellikle kendine birinde göstermesi.	
5. Çocuğunuzun evde verimli ders çalışabilmesi için siz ne yapmalısınız? Onu derslerine çalışması için elinden geleni yapmaya çalışırım. Dersleriyle ilgili bilmediği konuları varsa ondan araştırmasını, ben öğretmen değilim ama o konuları bilirim. O konuları ilgili arkadaşları ile paylaşarak öğrenir.	
6. Çocuğunuzun eğitiminde ne gibi sorumluluklarınız olduğuna inanıyorsunuz? Onu iyi bir gelecek hazırlamak, en sıkıcı dersleri onun için hatırlatmak, derslerinde başarılı olması için özel eğitimi.	
7. Çocuğunuzun eğitimine ne gibi katkılar yaparak yardımcı oluyorsunuz? Bana önce ona derslerinde başarılı olmasını bildiğim konuları ilgili yapıyor, ediyorum. Yani kalıpların ve diğer derslerde özel hoca tuttum. Diğer dersleri de öğütürüm.	
8. Çocuğunuzun derslerindeki başarısını nasıl arttırabileceğinizi düşünüyorsunuz? Tabiki sürekli ders çalışsa, konuları tek tek sorarak sorarak ve bilmediği konuları da ders göstermesi.	
9. Çocuğunuzun başarılı olması için bizden beklentileriniz nelerdir? Sizden beklentim sürekli dersleriyle ilgili soru sormanız, test çözdürmeniz, geriye kalan dersleriyle onu çalıştırmanız.	

Saygılarımla

## B) Children's open-ended questionnaire

### EVDE DERS ÇALIŞMANIZ

Cinsiyetiniz: Kız ☐ Erkek ☒

Sınıf: 7

1. Ders çalışma sisteminiz hakkında bilgi verir misiniz?

Günde mutlaka 2 saat ders çalışıyorum.

2. Ders çalışmadığınız zaman genellikle ne yaparsınız?

Akademik olmayan vakit geçiriyorum futbol oynuyorum

3. Evde ders çalışmanızı engelleyen durumlar sizce nelerdir?

Kardeşim ve eve misafir geldiğinde kuzenimin gürültü yapması ve evde ne yaparsam azeri işitirim ana verdiğinde babam den ender çalışmıyorsun.

4. Evde verimli ders çalışabilmeniz için sizce ne yapılmalıdır?

Ben ders çalışırken kimse beni rahatsız etmeyecek kimse kenus turmayacak

5. Evde ders çalışabilmeniz için:

a) Velileriniz neler yapıyor?

Babam gün boyu evde annem ev işlerini yapıyor su içmeyi giderimsin, sayarlar

b) Velilerinizin neleri yapmasını istersiniz?

Ben ana verdimsem bana bağır mayacaklar. Ders çalıştığım bilecekler. Ke ben ne zaman evde olsam bana okut ders çalış demeyecekler

c) Velilerinizin neleri yapmasını istemezsiniz?

Bana bağır maları istemiyim çok azan işitiyorum

6. Başarılı olabilmeniz için bizden beklentileriniz nelerdir?

Ben bütün hocalarımdan memnunum fakat matematik dersimize gelen hoca ders işlemiyor hep ders çalışıyor

## APPENDIX T: Ethical Approval Form

University of Leicester Ethics Review Sign Off Document



To: **NIHAT ALTINOZ**

Subject: Ethical Application Ref: **na217-1ecb**

*(Please quote this ref on all correspondence)*

---

**18/11/2013 10:22:24**

**School of Education**

Project Title: **Using an Intervention to Increase Parental Involvement in Science Education**

Thank you for submitting your application which has been considered.

This study has been given ethical approval, subject to any conditions quoted in the attached notes.

Any significant departure from the programme of research as outlined in the application for research ethics approval (such as changes in methodological approach, large delays in commencement of research, additional forms of data collection or major expansions in sample size) must be reported to your Departmental Research Ethics Officer.

Approval is given on the understanding that the University Research Ethics Code of Practice and other research ethics guidelines and protocols will be compiled with

- <http://www2.le.ac.uk/institution/committees/research-ethics/code-of-practice>
- <http://www.le.ac.uk/safety/>

The following is a record of correspondence notes from your application **na217-1ecb**. Please ensure that any proviso notes have been adhered to:-

--- END OF NOTES ---



## **APPENDIX U: An Example of one of the Parents Interview Transcript (Translated from Turkish and Summarized):**

**As a parent, what do you think are your responsibilities with regard to your child's learning? Do you think that it is your responsibility to help your child with their homework or with their learning at home and at school?**

As a parent, we try to show interest in our child's learning. I am very keen for this. On an individual level, I am trying to help with my child's learning at home because the current education system doesn't require my child to be responsible for his learning, to be aware of his responsibilities and to study regularly at home when we leave him alone. I think the current education system is to blame, but this may be the case for everyone. We, as his parents, may be guilty. Therefore, we are trying to fulfil part of our responsibilities by helping him at home. I regularly communicate with his teachers at school and asking them how can I help his learning, but I don't think I help him enough. Actually, I need to show more interest to his learning.

**Can you tell me about what you do to support your child's learning at home?**

Before the dinner, I start asking him how was your day, how was your lessons, how was your relationships with your friends and etc. By asking this questions I am trying to understand whether he had any issue with the school, teacher or his friends. According his responses, he generally doesn't want to do or concentrate on his home studying or his homework. He doesn't have any consciousness of this. Let's say he has homework for tomorrow, he might not care or mind about that. He spends his time doing different things. We make him sit at his table with our small push. I ask him, "What homework do you have? Do you have any homework for tomorrow? When should you have completed it?" He also has homework from the after-school centre. I say to him, "Look, you should complete your homework today without leaving it until tomorrow." Otherwise, he doesn't complete it. Let's say he has homework that needs to be completed for tomorrow, but he mostly doesn't care about that. Therefore, we need to push him to do his homework.

**Do you help your child with their homework or home studying as your responsibilities?**

I don't directly interfere with his homework, but I always tell him that if you have any issue or if you don't understand anything regarding your homework, you can come and ask it to me. You can have issues with your maths problems or with the topics you don't understand, but you can ask them to me anytime you want.

**How do you support your child's learning in general? Which lessons do you generally help?**

I give high importance of his maths lessons. I don't know why but he doesn't like math. He like science, but not math. He doesn't want to do any math related things. I don't care much about his other subjects such as Turkish studies, or social studies because he already spends enough time for them, but not enough time for math. He generally doesn't ask, but if I check I can see that he is struggling with some topics, and then I try to help him.

**How do you think you could improve your child's success in their lessons in general?**

I think that he should like his school and his teachers. If he likes them, then his success will automatically improve. I believe that. Of course, he needs to study, he needs to spend more time on his learning at home, he needs to read more books or may be use the internet. His success can increase by doing research, especially by searching his enjoyed topics, but I think that liking his school and his teacher are the main thing that improve the success.

**Have any of your child's teachers asked you (or explained to you how) to support your child's learning? If yes, what did the teacher want you to do?**

Yes, they frequently ask me to help my child's learning, but I don't think they should ask us to help our children's learning. I am sending my child to a private school, so the teachers should be responsible for most of the teaching staff.

**Can you explain why?**

I think that it is because of the system. The education systems require this but I am not sure. When I go to school to talk about his progress, the teacher and the school tell us to help our children's learning at home. They tell us show more interest in his learning, do different things, and etc. However, they don't tell anything about how to support his learning at home.

**Has your child asked you for any help with their homework or explained to you what they are learning in school?**

He doesn't ask directly. I need to check his homework or his learning for this. I interfere with his learning when I see him struggle. I ask him which questions you can't answer and then I tell him, 'Let's answer them together'.

**Do you generally communicate with your child's school and teachers? If yes, how often do you communicate and how do you communicate?**

I don't communicate regularly, but I don't miss any parents-teachers' meetings which happen twice in a year. I communicate with the teachers when we have an issue with my child, or if I see that he is behind target or not interested in his maths topics then I contact his maths teacher to try and understand what problems he is having and how can we help him. I ask them how we can resolve the issues, but I can't meet with the teacher face-to-face because of my work situation. I don't have enough time for this. Therefore, I prefer to use telephone calls to contact the teachers.

**In the previous questions, I asked you about your involvement in your child's learning. Now, I want to ask you about science learning. How important do you think is the learning of science for your child?**

I think that science lessons is very important for my child. In addition, science is included in the national exams, where he needs to get good marks so he can study at a good university. Science may also be relevant for his future job. He doesn't want to study medicine, but I think he would prefer a science or maths related career. He is currently thinking about computer engineering, but I think his decision will change. Therefore, maths and science are important for him.